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# FINAL REMEDIAL INVESTIGATION REPORT

Havertown PCP Site
Haverford Township
Delaware County, Pennsylvania

Volume 2, Chapters 5 - 10

DER Agreement Number ME - 86110
REWAI Project Number 86021

By

R. E. WRIGHT ASSOCIATES, INC.
3240 Schoolhouse Road
Middletown, PA 17057

AR300140

September 1988

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# CONTRACT LABORATORY PROGRAM (CLP)
# DATA QUALIFIERS

For reporting results in the accompanying chemical result tables, the following contract-specific qualifiers are used. The qualifiers defined below are not subject to modification by the laboratory.

The EPA-defined qualifiers to be used are as follows:

U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a compound that meets the identification criteria, but the result is less than the sample quantitation limit but greater than zero.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analysis is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

E - This flag identifies compounds whose concentrations exceed the calibration range of the instrument for that specific analysis. If one or more compounds have a response greater than full scale, the sample or extract must be diluted and reanalyzed according to the specifications.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

A - This flag indicates that a TIC is a suspected aldol-condensation product.

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X - Other specific flags and footnotes may be required to properly define the results.

# 5.0 HYDROGEOLOGIC INVESTIGATION

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# 5.0 HYDROGEOLOGIC INVESTIGATION

## 5.1 Site Geology

The Havertown PCP site is underlain by a relatively thin (2 to 28 feet) sequence of unconsolidated materials consisting of fill, micaceous saprolite, and biotite-schist saprolite overlying a biotite-quartz-feldspar schist and biotite-quartz-feldspar gneiss bedrock. Lithologic and well construction logs describing the different materials encountered during drilling are included in Appendix 1. Well locations are shown on Plate 1.

The typical lithologic sequence listed above appears fairly continuous from National Wood Preservers (NWP) property through Philadelphia Chewing Gum (PCG) property. However, at some point between PCG property and the rear of the properties of Rittenhouse Circle, the micaceous saprolite apparently thins out, resulting in fill overlying the biotite-schist saprolite and biotite-quartz-feldspar gneiss bedrock near Rittenhouse Circle. In addition, it appears that a limited amount of Pleistocene sand and gravel terrace deposits may be present in the vicinity of HAV-07. These deposits may have eroded into or have been deposited upon the biotite-schist saprolite, which overlies the bedrock, prior to being covered by fill. Figure 5-1 summarizes the stratigraphic column for the geologic units encountered at the Havertown PCP site.

The surficial layer of fill material consists of varying percentages of very fine- to coarse-grained sand, silt, and gravel, with lesser amounts of cinders, wood, and metal debris and railroad ties (on NWP property). The depth of the fill appears to be fairly consistent (approximately five feet) under the NWP plant; however, along the west side of Eagle Road,

| FORMATION | STRATIGRAPHIC SECTION | THICKNESS IN FEET +/- | DESCRIPTION |
|---|---|---|---|
| | | 0.05 | Macadam; parking lots, road surface. |
| | | 2–18 | Fill; varying percentages of very fine to coarse grained sand, silt, and gravel. Lesser amounts of cinders, wood, and metal debris. |
| Unconformity<br>Pleistocene Terrace Deposits | | 6?<br>VARIES | Sand and gravel deposit; not encountered during the RI. |
| Unconformity? | | <5–13 | Micaceous Saprolite; dark yellowish-orange to moderate yellowish-brown highly micaceous, very fine to medium-grained sand, with some silt. Remnant foliation dipping 35 to 40 degrees. |
| Gradational?<br>Wissahickon Formation | | 4–18 | Biotite-Schist Saprolite; brownish-black and dark gray, highly micaceous fine to medium-grained silty sand. Remnant foliation dipping approximately 40 degrees. |
| Gradational? | | UNKNOWN | Biotite-Quartz-Feldspar Schist/Gneiss; very light gray and dark gray, highly foliated, (dipping 30 degrees) moderately fractured. Conformable pegmatite pods and stringers. |

**FIGURE 5-1**

**HAVERTOWN PCP SITE**
HAVERTOWN, PA

**GENERALIZED STRATIGRAPHIC COLUMN**

| drawn CCS | approved JNW | drawing no. |
|---|---|---|
| checked JST | date 5-25-88 | 86021-033-AA |

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middletown pennsylvania

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approximately 5 to 15 feet of fill are present under the Support Zone, Swiss Farm Market, and Young's Produce. On the east side of Eagle Road, the fill thickens toward the northeast and ranges between 4 and 18 feet thick. The amount of fill then thins eastward and ranges between 0 and 4 feet thick in the Rittenhouse Circle area.

Directly underlying the fill is a saprolite unit which, based upon field examination, has been segregated into two divisions using the apparent mineralogies and interpreted parent materials. The upper saprolite division consists of a dark yellowish-orange to moderate yellowish-brown highly micaceous, very fine to medium-grained sand, with some silt (SP and SM). Remnant foliation from the parent bedrock is occasionally present and dips approximately 35 to 40 degrees from the horizontal with some unknown strike. Highly weathered muscovite schist fragments are present throughout the interval. The basal saprolite division appears to directly underlie the upper saprolite division throughout the study area, with the exception of the Rittenhouse Circle area just east of PCG. Here, the basal saprolite directly underlies the fill layer. The basal saprolite consists of a brownish-black and dark gray highly micaceous fine- to medium-grained silty sand (SP-SM). Remnant foliation from the parent bedrock is fairly common and dips approximately 40 degrees from the horizontal with an unknown strike. Highly weathered biotite schist/gneiss fragments are present throughout the division.

Directly underlying the basal saprolite throughout the study area is a very light gray and dark gray biotite-quartz-feldspar schist/gneiss bedrock. The contact separating the overlying saprolites from the bedrock appears to be highly gradational, probably a result of variations in weathering. Observations made during the drilling program indicate that the bedrock appears highly foliated under the NWP plant and seems to become less foliated eastward under the PCG plant. Throughout the area of investigation, the bedrock is moderately fractured, with numerous weathered zones separated by more competent rock. Most fractures were observed to form along the planes of foliation, which dip at approximately 30 degrees from the horizontal. Because rock cores obtained during the drilling program could not be oriented to an azimuth line without expensive drilling techniques, the strike and direction of dip could not be ascertained. In addition, infrequent minor shallow and high-angle fractures were present within the bedrock. In the deep exploratory wells on the east side of Eagle Road on the PCG property, the bedrock was observed to contain small (approximately one foot in thickness) pegmatite pods consisting of quartz, oligoclase feldspar, muscovite, and a trace of biotite. These pods appeared to be conformable with the foliation and contained minor intra- and intergranular fractures. In the deep monitoring well at CW-4, these fractures in the pegmatite pods were highly solutioned and appeared to provide a good pathway for water to move.

A reconnaissance of the area around the site was performed to identify bedrock outcrop exposures and to measure the orientation of any fractures which were found. Only two outcrop exposures were located in the vicinity of the site. The first was a rather poor bedrock exposure in an embankment along the east-west trending abandoned railroad bed which essentially parallels the northern fence line of NWP. The outcrop is located on the south side of the abandoned bed, approximately 2,500 feet west of NWP. Bedrock here consisted of soft to moderately hard, heavily weathered schist, which possessed a well-developed foliation (laminated appearance) and prominent joints (fractures in rock). Foliation was found to be oriented north 50 to 64 degrees east and dipping 83 degrees northwest, while joints were oriented north 68 degrees west dipping 39 degrees south-southwest and north 72 degrees west dipping 84 degrees south-southwest.

The second outcrop investigated was located in an old quarry located approximately 7,500 feet southeast of the site, near the intersection of Route 1 and Route 3. Here, the bedrock consisted of a hard, quartz and muscovite schist, with well-developed foliation and joint patterns. Foliation was measured as north 64 degrees east dipping 42 degrees north-northwest, while joints were observed with orientations of north 61 degrees east dipping 82 degrees north; north 68 degrees east dipping 83 degrees south; and south 61 degrees west dipping 79 degrees south-southeast.

To further attempt to identify bedrock fracturing, a fracture trace analysis was performed for the site. Fracture trace analysis employs studying aerial photographs for natural linear features which may consist of tonal variations in soils, alignment of vegetation, valleys, ridges, etc., that exhibit some linear orientation. Fracture traces frequently are zones which are less resistant to erosion than the surrounding materials, thereby affording an increased permeability. In addition, these zones may also be areas of groundwater drainage.

A review of available historical aerial photographs from 1958 until 1973 yielded no additional fracture information, as the area consisted primarily of densely populated urban land.

### 5.1.1 Geologic Cross-Sections

Using the combined geologic information from previous investigations and the current RI studies, two geologic cross-sections labeled A-A' and B-B', as shown on Figure 5-2, have been constructed. As shown on Plate 2, cross-section A-A' depicts the interpretation of the subsurface geology from west to east across the site, while cross-section B-B' provides a subsurface view from the northwest to the southeast.

On cross-section A-A', there are three units which comprise the geologic materials found under the site. Listed in increasing depth below the ground surface, these are fill; a saprolite unit, which has been separated into two divisions; and the schist/gneiss bedrock.

The fill unit is of a fairly uniform depth across the NWP property and becomes somewhat thicker in the vicinity of the support zone. The thickness of the fill is not known under Eagle Road; however, it significantly thickens eastward toward monitoring well series CW-6. The water table apparently does not extend into the fill unit in this cross section; however, it does come very close to its base between monitoring well series CW-3 and CW-6.

The saprolite unit has been separated into two divisions, an upper micaceous saprolite and a basal biotite-schist saprolite, based upon the unit's field-estimated mineral composition and inferred parent rock origin. The micaceous saprolite division is a highly weathered layer which is thickest on the west side of Eagle Road, while thinning abruptly and slightly increasing its dip east of the road. From the west toward the east, the layer

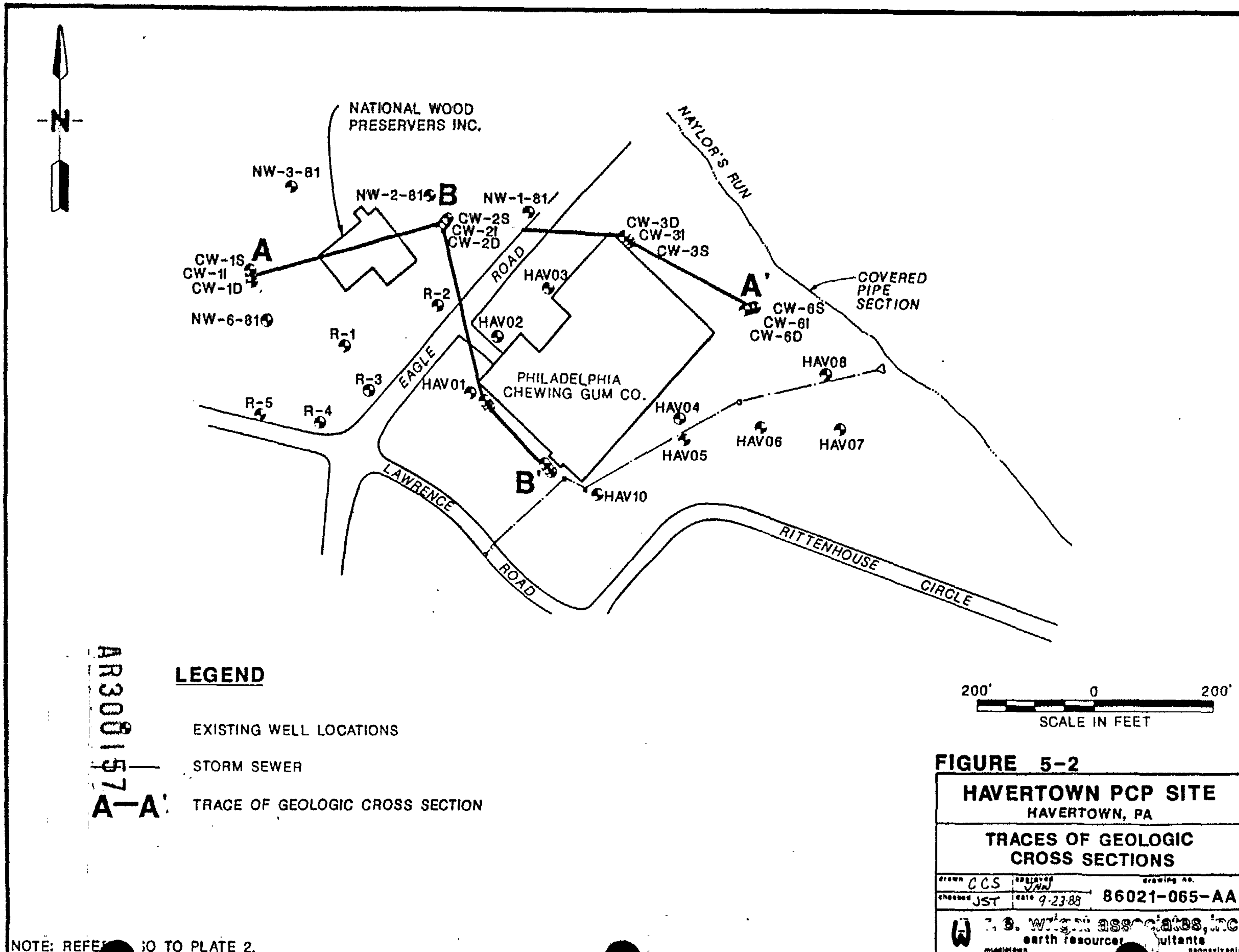


FIGURE 5-2

| |
|---|
| HAVERTOWN PCP SITE<br>HAVERTOWN, PA |
| TRACES OF GEOLOGIC CROSS SECTIONS |
| drawn CCS · approved [illegible] · drawing no. 86021-065-AA |
| checked JST · date 9-23-88 |
| earth resource consultants · middletown · pennsylvania |

NOTE: REFE[illegible] TO PLATE 2.

goes from mostly saturated to slightly saturated under Eagle Road and then becomes almost fully saturated eastward.

The biotite-schist saprolite division follows approximately the same thickness pattern as the micaceous saprolite layer in that it is thick west of Eagle Road and abruptly thins and remains thin east of Eagle Road. It appears that the biotite-schist saprolite division is fully saturated across this cross-section (A-A').

The biotite-quartz-feldspar schist/gneiss (bedrock) seems to possess a minor mound-like shape under Eagle Road, which is exaggerated three times because of the cross-section scales. The origin of this mound is not known; however, its presence may play a significant role in the groundwater hydrology at the site. To the west of the mound, the bedrock gently slopes downward toward Eagle Road, while east of the mound, the bedrock surface has a slightly greater eastward dip. The bedrock is completely saturated across the site and there are no apparent confining layers.

Cross-section B-B' provides a view of the geology of the site looking northeast. The geologic units are the same as those described previously in cross-section A-A'; however, because of uncertainties in or the lack of geologic information on previously installed monitoring wells, the cross-section (B-B') is highly interpretive between monitoring well series CW-2 and CW-4. As interpreted, a bedrock high occurs in the vicinity of well R-2, in a fashion similar to that presented in cross-section A-A'.

Above the bedrock lies the saprolite unit as discussed previously; however, between CW-2 and CW-4 series monitoring wells, the division contacts are uncertain. This uncertainty factor will become important when dealing with contaminant migration, covered in Section 5.3.6. As depicted though, the biotite-schist saprolite is almost completely saturated across this area, except in the vicinity of well R-2. The overlying micaceous saprolite division is only slightly saturated. It appears then that the surficial fill unit is completely unsaturated (by the water table) at this location, except possibly near storm sewer inlet #2 where a higher water table could intersect the base of the fill. Accordingly, the storm sewer inlets (#1 and #2) do not appear to influence groundwater or contaminant flow at this location.

Hydraulic potential and generalized groundwater flow lines are presented on these figures. Discussion concerning them will be presented in Section 5.3.4.

### 5.1.2 Geologic Fence Diagram

To organize and effectively present the hydrogeologic information obtained by previous investigations, as well as the data from the current RI, REWAI has compiled an interpretation of the subsurface at the Havertown PCP site as shown by Plate 3. This drawing, known as a fence diagram, combines the geologic data from available sources and depicts the interpretation in a three-dimensional perspective. The diagram is vertically exaggerated three times and the NWP and PCG buildings are overlain to provide an orientation from which observers may study the site.

There are five different stratigraphic units which are presented on the fence diagram, namely: macadam, fill, sand and gravel, saprolite, and biotite-quartz-feldspar schist/gneiss (bedrock). The interrelationships between the various units, as described previously in Section 5.2, may be observed on the fence diagram. Portions of the diagram at the NWP plant (NW-2-81 and NW-3-81) and along Eagle Road (R-2, R-3, R-4, and R-5) are either blank or heavily question marked as a result of lack of geologic and well construction data from previous investigator's well logs. This results in large uncertainties in providing a correlation with newly acquired data. The net result is a lack of information needed to ascertain the migration pathways for immiscible and dissolved contaminants in the groundwater system.

Overall, the fence diagram provides the viewer with information concerning the spatial orientations of the geologic units, the monitoring wells constructed in them, and the man-made factors which may influence groundwater flow. It is suggested that the reader refer to the fence diagram while reading appropriate report sections which follow.

## 5.2 Soil Investigation

### 5.2.1 Introduction

The purpose of the soil sampling program was to determine estimates of the presence, extent, and degree of soil contamination at the NWP plant and to establish or modify levels of personnel protection required for future invasive activities.

At each of eight locations shown on Figure 5-3, an attempt was made to collect soil samples from four depths: surface, one foot, two feet, and three feet. Based upon the results of a field OVA scan of the samples, 16 samples and 1 duplicate sample were chosen for analysis from the anticipated 32 samples to be obtained. In addition, two background samples which were collected off-site (at REWAI's office in Middletown, Pennsylvania) and one performance evaluation sample were included as part of the dioxin/dibenzofuran analysis. Soil samples were analyzed for dioxin and chlorinated dibenzofuran isomers, the complete Hazardous Substance List (HSL), and oil and grease.

Soil sampling began on July 16, 1987, by utilizing a 3 1/2-inch diameter hand auger in which to collect samples from the specified depths. It was immediately apparent that due to the nature of the fill material at the NWP plant--consisting largely of tightly compacted sand, gravel, slag, and railroad ties--hand augering would not succeed in providing the necessary samples. A backhoe was then obtained to assist with sampling. Sample collection resumed on July 20, 1987, and continued through July 22, 1987. Even with the use of the backhoe, only 14 of the anticipated 32 soils samples were collected from the 8 sample points because of refusal of the backhoe caused by fill materials.

### 5.2.2 Collection of Soil Samples

At each soil sampling location, samples were collected at each consecutive depth interval required, unless backhoe refusal was attained first. Prior to mobilizing on to the next sampling location, the backhoe, sampling equipment, and the sampler's outer gloves were decontaminated with a high pressure steam

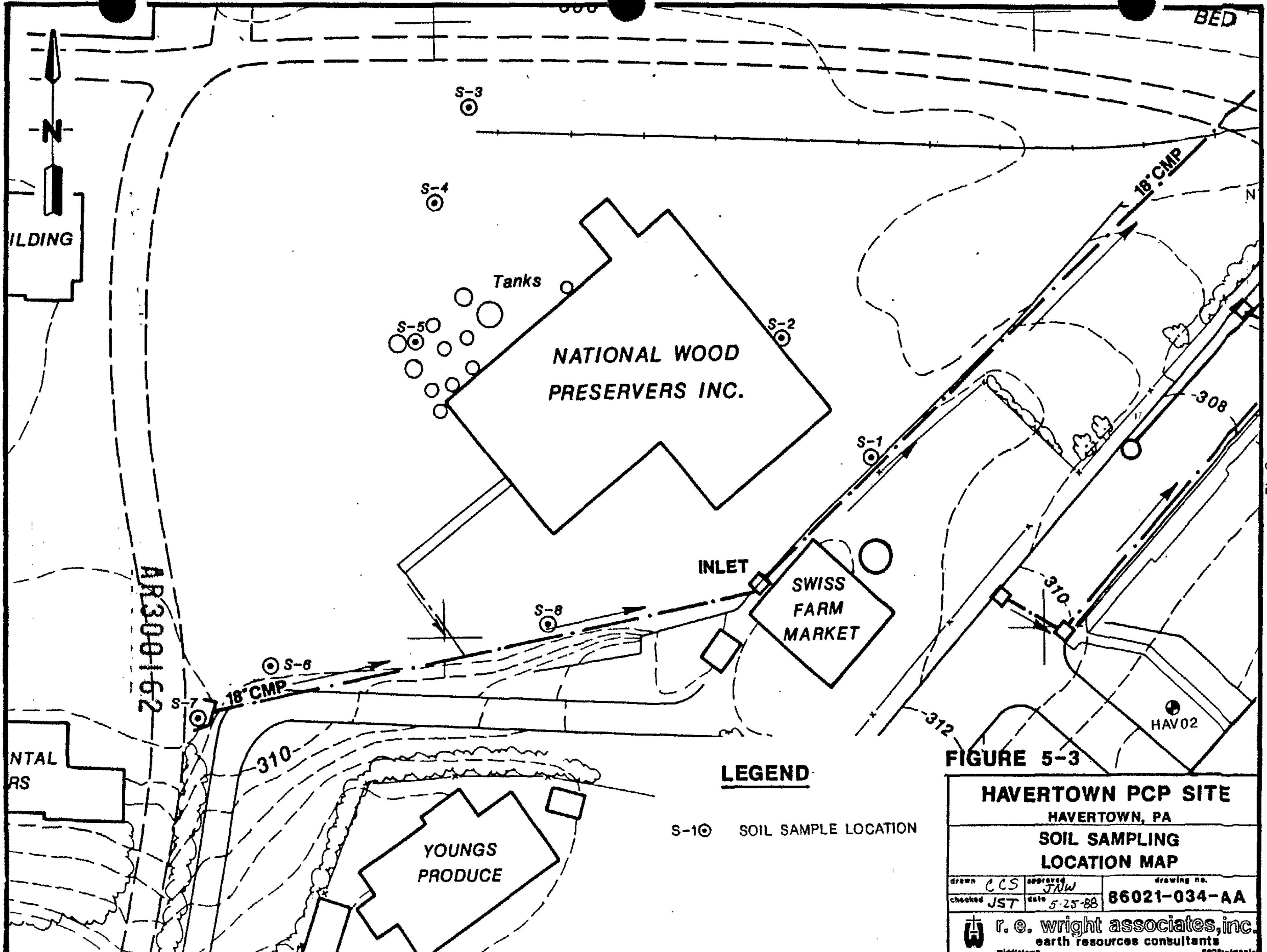


FIGURE 5-3

HAVERTOWN PCP SITE
HAVERTOWN, PA

SOIL SAMPLING
LOCATION MAP

drawn CCS | approved JNW | drawing no. 86021-034-AA
checked JST | date 5-25-88

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earth resources consultants
middletown pennsylvania

cleaner. This procedure was used to reduce the potential for cross contamination.

Upon mobilizing to the next sampling point, the sampler would obtain two samples of the surface (zero to two inches) interval using a clean stainless steel trowel. One sample was placed into a laboratory pre-cleaned 1000 milliliter (ml) clear glass, widemouth sample bottle, provided by the U. S. Environmental Protection Agency (EPA), for dioxin and chlorinated dibenzofuran analysis, while the second sample was placed into a 1 liter, widemouth, amber glass bottle for HSL and oil and grease analysis by CompuChem Laboratories.

Successive depth intervals were attained, one at a time, by use of the backhoe. At each depth interval, the vertical wall of the excavation was first scraped off to expose a fresh soil surface. Samples were then collected from the vertical wall and placed into the appropriate glassware as previously described. All sample bottles were appropriately labeled as directed by the Site Operations Plan (SOP). The HSL soil samples were placed into sample shuttles with cold packs and shipped by Federal Express to REWAI's laboratory subcontractor, CompuChem Laboratories. The dioxin/dibenzofuran soil samples were wrapped in aluminum foil to reduce their exposure to light and packaged on ice in 48-quart coolers. As per EPA's instructions, the dioxin/dibenzofuran soil samples were shipped to California Analytical Laboratory (CAL) for analysis under the direction of EPA as Case #3150C.

### 5.2.3 Results of Soil Sampling

5.2.3.1 Metals - Soil samples were collected at various depths between the surface and three feet at eight locations on the NWP plant site. The results of the analysis for total metals in the soil samples are shown in Table 5-1. The metals which exhibited the highest concentrations in soil samples at NWP were calcium, magnesium, iron, aluminum, sodium, and potassium. Lesser amounts, although still elevated, of arsenic, cadmium, chromium, copper, lead, mercury, and zinc were also found.

These last metals listed are the primary metals of concern at the Havertown PCP site because most of these metals are constituents of wood treating solutions presently used on a routine basis at NWP. Reviewing the data for the metals of concern in Table 5-1 indicates that elevated quantities of arsenic, chromium, copper, lead, and zinc are present in the soils. Arsenic has reported concentrations ranging between 1.4 and 6850 ug/kg, while chromium was found between 56 and 22,300 ug/kg. Copper was detected at levels between 43 and 9,790 ug/kg, and lead at 12 to 108 ug/kg. Zinc was present at levels from 183 to 13,000 ug/kg.

Figure 5-4 depicts the total concentrations of arsenic, cadmium, chromium, copper, lead, and zinc, in ug/kg in NWP soils. Because this was a preliminary soil investigation, designed more to detect the presence of contaminants and the concentrations at which they are present, and due to the small sample base, in which 14 samples were analyzed from 8 locations, it would be inappropriate to contour contaminant concentrations. It is apparent from the map, that the area around the storage tanks has significantly higher concentrations of metals than other sampled

Table 5-1
Soil Metals Results

| CMPD | CL | CMPD-DESC | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | |
| | | POINT | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | |
| | | SAMPLE | SI 0'-6" | | S-1 2' | | S-2 1' | | S-3 1' | | S-3 1.5' | | S-4 2' | | S-4 3' | |
| | | DATE | 07/16/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | |
| | | DEPTH | 0 | | 2' | | 1' | | 1' | | 1.5' | | 2' | | 3' | |
| | | MATRIX | SO | | SO | | SO | | SO | | SO | | SO | | SO | |
| | | METALS LAB I.D. # | 141516 | | 142905 | | 142906 | | 142907 | | 142908 | | 142909 | | 142910 | |
| 101 | M | ANTIMONY | 12 | N UG/KG | BDL | 11 UG/KG | BDL | 11 UG/KG | BDL | 10 UG/KG | BDL | 10 UG/KG | BDL | 11 UG/KG | BDL | 11 UG/KG |
| 102 | M | ARSENIC | 280 | UG/KG | 54 | UG/KG | 162 | UG/KG | 137 | UG/KG | 191 | UG/KG | 466 | UG/KG | 208 | UG/KG |
| 103 | M | BERYLLIUM | 0.52 | UG/KG | 0.88 | UG/KG | 0.48 | UG/KG | 0.67 | UG/KG | 0.93 | UG/KG | 0.52 | UG/KG | 0.66 | UG/KG |
| 104 | M | CADMIUM | BDL | 0.89 UG/KG | BDL | 0.9 UG/KG | 1.3 | N UG/KG | 1.2 | N UG/KG | 0.99 | N UG/KG | 1.5 | N UG/KG | 1.2 | UG/KG |
| 105 | M | CHROMIUM | 240 | UG/KG | 82 | UG/KG | 328 | UG/KG | 384 | UG/KG | 489 | UG/KG | 426 | UG/KG | 261 | UG/KG |
| 106 | M | COPPER | 107 | UG/KG | 43 | UG/KG | 111 | UG/KG | 88 | UG/KG | 110 | UG/KG | 121 | UG/KG | 91 | UG/KG |
| 107 | M | LEAD | 26 | * UG/KG | 19 | N F UG/KG | 32 | * UG/KG | 44 | N F UG/KG | 56 | N F UG/KG | 60 | * UG/KG | 108 | * UG/KG |
| 108 | M | MERCURY | 0.33 | * CV UG/KG | 0.17 | * CV UG/KG | BDL | 0.1 UG/KG | 0.27 | * CV UG/KG | 0.6 | * CV UG/KG | 0.24 | * CV UG/KG | 0.31 | * CV UG/KG |
| 109 | M | NICKEL | 7.8 | UG/KG | 13 | UG/KG | 14 | UG/KG | 21 | UG/KG | 17 | UG/KG | 29 | UG/KG | 21 | UG/KG |
| 110 | M | SELENIUM | BDL | 5.6 UG/KG | BDL | 5.8 UG/KG | BDL | 5.5 UG/KG | BDL | 5.6 UG/KG | BDL | 5.5 UG/KG | BDL | 5.6 UG/KG | BDL | 5.9 UG/KG |
| 111 | M | SILVER | BDL | 1.6 UG/KG | BDL | 1.6 UG/KG | BDL | 1.5 UG/KG | BDL | 1.5 UG/KG | BDL | 1.5 UG/KG | BDL | 1.6 UG/KG | BDL | 1.6 UG/KG |
| 112 | M | THALLIUM | BDL | 0.49 UG/KG | BDL | 0.51 UG/KG | BDL | 0.48 UG/KG | BDL | 0.49 UG/KG | BDL | 4.8 UG/KG | BDL | 0.498 UG/KG | BDL | 0.52 UG/KG |
| 113 | M | ZINC | 627 | UG/KG | 206 | UG/KG | 844 | UG/KG | 1370 | UG/KG | 1250 | UG/KG | 1230 | UG/KG | 906 | UG/KG |
| 114 | M | BARIUM | 80 | UG/KG | 126 | UG/KG | 109 | UG/KG | 99 | UG/KG | 115 | UG/KG | 141 | UG/KG | 130 | UG/KG |
| 115 | M | IRON | 10900 | UG/KG | 15700 | UG/KG | 13100 | UG/KG | 28500 | UG/KG | 29000 | UG/KG | 9830 | UG/KG | 7530 | UG/KG |
| 116 | M | MANGANESE | 440 | N UG/KG | 376 | N UG/KG | 460 | N UG/KG | 3050 | N UG/KG | 3410 | N UG/KG | 319 | N UG/KG | 348 | N UG/KG |
| 117 | M | VANADIUM | 30 | E UG/KG | 38 | E UG/KG | 35 | E UG/KG | 120 | E UG/KG | 158 | E UG/KG | 28 | E UG/KG | 26 | E UG/KG |
| 118 | M | ALUMINUM | 5430 | UG/KG | 10500 | UG/KG | 7290 | UG/KG | 5770 | UG/KG | 6860 | UG/KG | 6370 | UG/KG | 5840 | UG/KG |
| 120 | M | COBALT | 7.3 | UG/KG | 10 | UG/KG | 7.7 | UG/KG | 3.2 | UG/KG | 3 | UG/KG | 5 | UG/KG | 5.5 | UG/KG |
| 121 | M | MAGNESIUM | 79900 | UG/KG | 29900 | UG/KG | 40500 | UG/KG | 66300 | UG/KG | 59800 | UG/KG | 44100 | UG/KG | 75200 | UG/KG |
| 129 | M | CALCIUM | 134000 | UG/KG | 51000 | UG/KG | 69900 | UG/KG | 126000 | UG/KG | 119000 | UG/KG | 75100 | UG/KG | 129000 | UG/KG |
| 130 | M | SODIUM | 1610 | UG/KG | 896 | UG/KG | 1290 | UG/KG | 2100 | UG/KG | 1890 | UG/KG | 1470 | UG/KG | 2050 | UG/KG |
| 131 | M | POTASSIUM | 2600 | UG/KG | 3360 | UG/KG | 3480 | UG/KG | 1540 | UG/KG | 1580 | UG/KG | 2200 | UG/KG | 1520 | UG/KG |

Table 5-1 (Cont'd)

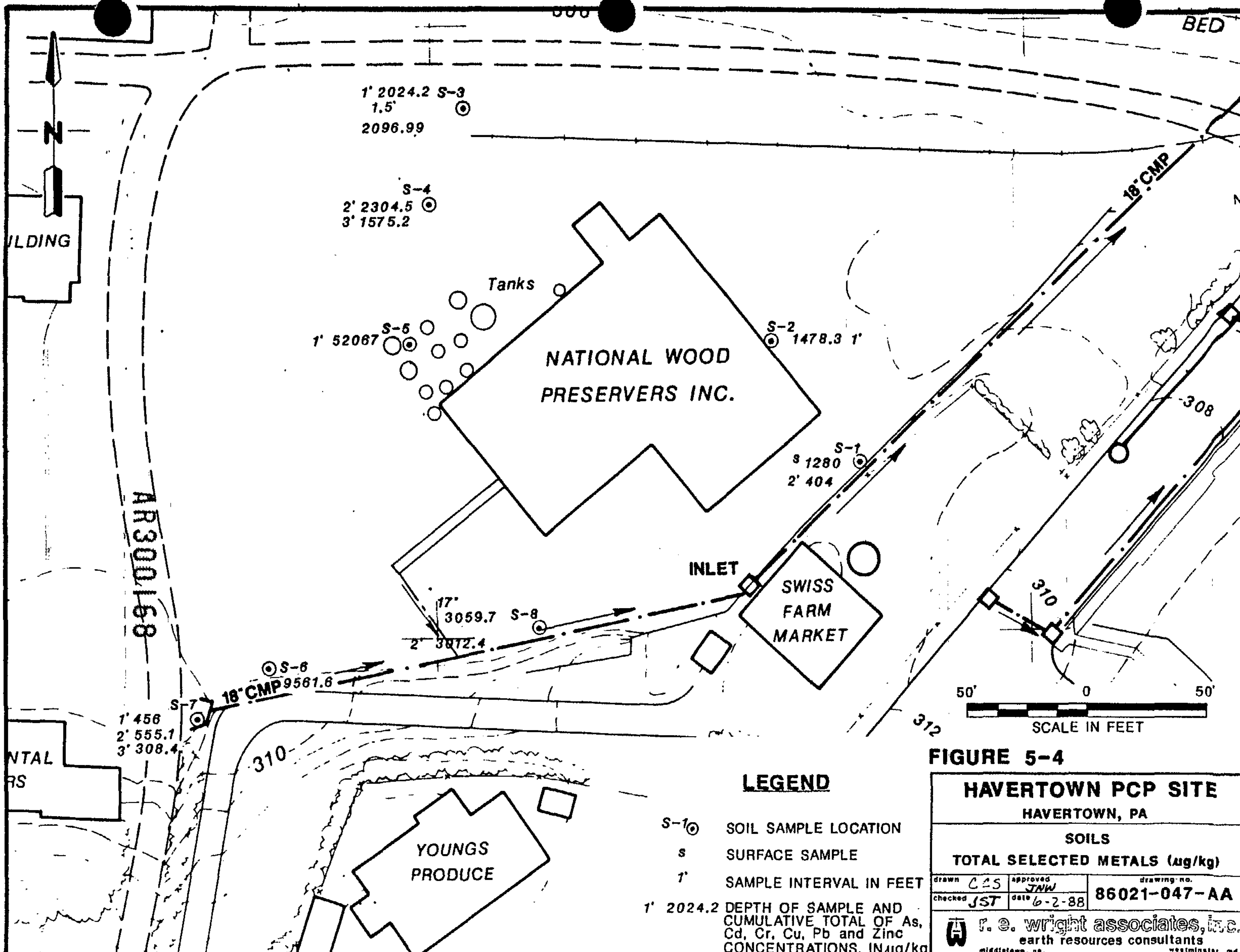
Soil Metals Results

| CMPD | CL | CMPD-DESC | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SITE | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | |
| | | | POINT | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | |
| | | | SAMPLE | S-5 1' | | S-6 1' | | S-7 1' | | S-7 2' | | S-7 3' | | S-8 17' | | S-8 2' | |
| | | | DATE | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | |
| | | | DEPTH | 1' | | 1' | | 1' | | 2' | | 3' | | 17' | | 2' | |
| | | | MATRIX | SO | | SO | | SO | | SO | | SO | | SO | | SO | |
| | | | METALS LAB I.D. # | 142911 | | 142912 | | 142913 | | 142914 | | 142915 | | 142916 | | 142917 | |
| 101 | M | ANTIMONY | | BDL | 17 UG/KG | BDL | 11 UG/KG | BDL | 11 UG/KG | BDL | 11 UG/KG | BDL | 11 UG/KG | 11 | N UG/KG | BDL | 11 UG/KG |
| 102 | M | ARSENIC | | 6850 | UG/KG | 889 | UG/KG | 43 | UG/KG | 62 | UG/KG | 1.4 | F UG/KG | 428 | UG/KG | 456 | UG/KG |
| 103 | M | BERYLLIUM | | 0.63 | UG/KG | 0.83 | UG/KG | 0.62 | UG/KG | 3.7 | UG/KG | 4.2 | UG/KG | 0.85 | UG/KG | 0.86 | UG/KG |
| 104 | M | CADMIUM | | 44 | N UG/KG | 9.6 | N UG/KG | BDL | 0.94 UG/KG | 1.1 | N UG/KG | BDL | 0.93 UG/KG | 1.7 | N UG/KG | 1.4 | N UG/KG |
| 105 | M | CHROMIUM | | 22300 | UG/KG | 2150 | UG/KG | 67 | UG/KG | 167 | UG/KG | 56 | UG/KG | 508 | UG/KG | 495 | UG/KG |
| 106 | M | COPPER | | 9790 | UG/KG | 680 | UG/KG | 46 | UG/KG | 62 | UG/KG | 56 | UG/KG | 203 | UG/KG | 179 | UG/KG |
| 107 | M | LEAD | | 83 | * UG/KG | 83 | * UG/KG | 60 | * UG/KG | 17 | N F UG/KG | 12 | N UG/KG | 69 | * UG/KG | 31 | * UG/KG |
| 108 | M | MERCURY | | 1.8 | * CV UG/KG | 0.48 | * CV UG/KG | 0.13 | * CV UG/KG | 0.1 | UG/KG | BDL | 0.11 UG/KG | 4 | * CV UG/KG | 2 | * CV UG/KG |
| 109 | M | NICKEL | | 55 | UG/KG | 14 | UG/KG | 13 | UG/KG | 35 | UG/KG | 23 | UG/KG | 14 | UG/KG | 16 | UG/KG |
| 110 | M | SELENIUM | | BDL | 0.89 UG/KG | BDL | 5.8 UG/KG | BDL | 5.9 UG/KG | BDL | 5.8 UG/KG | BDL | 5.8 UG/KG | BDL | 5.6 UG/KG | BDL | 5.6 UG/KG |
| 111 | M | SILVER | | BDL | 2.5 UG/KG | BDL | 1.7 UG/KG | BDL | 1.6 UG/KG | BDL | 1.6 UG/KG | BDL | 1.6 UG/KG | BDL | 1.6 UG/KG | BDL | 1.6 UG/KG |
| 112 | M | THALLIUM | | BDL | 0.79 UG/KG | 0.54 | UG/KG | BDL | 0.52 UG/KG | 0.7 | UG/KG | 1.1 | UG/KG | BDL | 0.49 UG/KG | BDL | 0.5 UG/KG |
| 113 | M | ZINC | | 13000 | UG/KG | 5750 | UG/KG | 240 | UG/KG | 246 | UG/KG | 183 | UG/KG | 1850 | UG/KG | 1850 | UG/KG |
| 114 | M | BARIUM | | 39 | UG/KG | 163 | UG/KG | 173 | UG/KG | 823 | UG/KG | 499 | UG/KG | 113 | UG/KG | 115 | UG/KG |
| 115 | M | IRON | | 36900 | UG/KG | 27200 | UG/KG | 16900 | UG/KG | 58700 | UG/KG | 47700 | UG/KG | 13000 | UG/KG | 13500 | UG/KG |
| 116 | M | MANGANESE | | 70 | N UG/KG | 2700 | N UG/KG | 371 | N UG/KG | 1300 | N UG/KG | 1820 | N UG/KG | 415 | N UG/KG | 430 | N UG/KG |
| 117 | M | VANADIUM | | 34 | E UG/KG | 100 | E UG/KG | 47 | E UG/KG | 162 | E UG/KG | 138 | E UG/KG | 43 | E UG/KG | 40 | E UG/KG |
| 118 | M | ALUMINUM | | 958 | UG/KG | 8880 | UG/KG | 9970 | UG/KG | 33800 | UG/KG | 24000 | UG/KG | 8430 | UG/KG | 8790 | UG/KG |
| 120 | M | COBALT | | BDL | 1.4 UG/KG | 8.4 | UG/KG | 11 | UG/KG | 60 | UG/KG | 90 | UG/KG | 8.2 | UG/KG | 8.7 | UG/KG |
| 121 | M | MAGNESIUM | | 3260 | UG/KG | 42600 | UG/KG | 56700 | UG/KG | 16600 | UG/KG | 12100 | UG/KG | 44500 | UG/KG | 37900 | UG/KG |
| 129 | M | CALCIUM | | 7330 | UG/KG | 81500 | UG/KG | 87500 | UG/KG | 4670 | UG/KG | 5010 | UG/KG | 90600 | UG/KG | 88500 | UG/KG |
| 130 | M | SODIUM | | 10900 | UG/KG | 5230 | UG/KG | 1220 | UG/KG | 1550 | UG/KG | 1140 | UG/KG | 2310 | UG/KG | 2220 | UG/KG |
| 131 | M | POTASSIUM | | BDL | 822 UG/KG | 3640 | UG/KG | 6270 | UG/KG | 15200 | UG/KG | 9500 | UG/KG | 3500 | UG/KG | 3640 | UG/KG |

Table 5-1 (Cont'd)

Soil Metals Results

| CMPD | CL | CMPD-DESC | | | | |
|---|---|---|---|---|---|---|
| | | | SITE | 86021 | | |
| | | | POINT | SOIL | | |
| | | | SAMPLE | S-8 2'DUP | | |
| | | | DATE | 07/23/87 | | |
| | | | DEPTH | 2' | | |
| | | | MATRIX | SO | | |
| | | | METALS LAB I.D. # | 142918 | | |
| 101 | M | ANTIMONY | | 12 | N | UG/KG |
| 102 | M | ARSENIC | | 326 | | UG/KG |
| 103 | M | BERYLLIUM | | 1.4 | | UG/KG |
| 104 | M | CADMIUM | | 2.5 | N | UG/KG |
| 105 | M | CHROMIUM | | 401 | | UG/KG |
| 106 | M | COPPER | | 164 | | UG/KG |
| 107 | M | LEAD | | 34 | * | UG/KG |
| 108 | M | MERCURY | | 2.3 | * CV | UG/KG |
| 109 | M | NICKEL | | 16 | | UG/KG |
| 110 | M | SELENIUM | | BDL | 5.9 | UG/KG |
| 111 | M | SILVER | | BDL | 1.6 | UG/KG |
| 112 | M | THALLIUM | | BDL | 0.52 | UG/KG |
| 113 | M | ZINC | | 1690 | | UG/KG |
| 114 | M | BARIUM | | 146 | | UG/KG |
| 115 | M | IRON | | 13400 | | UG/KG |
| 116 | M | MANGANESE | | 774 | N | UG/KG |
| 117 | M | VANADIUM | | 44 | E | UG/KG |
| 118 | M | ALUMINUM | | 13500 | | UG/KG |
| 120 | M | COBALT | | 9.8 | | UG/KG |
| 121 | M | MAGNESIUM | | 32900 | | UG/KG |
| 129 | M | CALCIUM | | 87800 | | UG/KG |
| 130 | M | SODIUM | | 2850 | | UG/KG |
| 131 | M | POTASSIUM | | 5300 | | UG/KG |


BED
N
ILDING
NTAL
RS
1' 2024.2 S-3
1.5'
2096.99
S-4
2' 2304.5
3' 1575.2
Tanks
S-5
1' 52067
S-2
1478.3 1'
NATIONAL WOOD
PRESERVERS INC.
18" CMP
S-1
s 1280
2' 404
308
INLET
SWISS
FARM
MARKET
310
17'
3059.7
S-8
2' 3012.4
S-6
18" CMP 9561.6
S-7
1' 456
2' 555.1
3' 308.4
310
312
YOUNGS
PRODUCE
50' 0 50'
SCALE IN FEET
FIGURE 5-4
LEGEND
S-1 SOIL SAMPLE LOCATION
s SURFACE SAMPLE
1' SAMPLE INTERVAL IN FEET
1' 2024.2 DEPTH OF SAMPLE AND CUMULATIVE TOTAL OF As, Cd, Cr, Cu, Pb and Zinc CONCENTRATIONS, IN µg/kg
HAVERTOWN PCP SITE
HAVERTOWN, PA
SOILS
TOTAL SELECTED METALS (µg/kg)
drawn CAS
approved JNW
checked JST
date 6-2-88
drawing no. 86021-047-AA
r. e. wright associates, inc.
earth resources consultants
middletown, pa.
westminster, md.

locations. It is not believed that the full range of metals contamination was assessed by this soil sampling program.

5.2.3.2 Volatile Organic Aromatics - Volatile organic aromatic (VOA) chemical analysis was performed on soil samples collected from the NWP site. The results of this analysis, presented on Table 5-2, indicate that methylene chloride, acetone, 2-butanone, and total xylenes were the most frequently identified VOAs in the soil. However, because methylene chloride and acetone are frequent laboratory contaminants, their presence in the soil samples may be questionable. Accordingly, total xylenes was the most frequently identified VOA specie in the soil samples, with detected concentrations ranging from 5.1 to 2800 ug/kg. Also found in elevated concentrations were ethylbenzene (3.8 to 490 ug/kg), and toluene (6.1 to 390 ug/kg). Lesser amounts, listed in decreasing order, of benzene, 4-methyl-2-pentanone, chloromethane, tetrachloroethene, bromomethane, and trichloroethene were also identified.

Based upon this soil sampling, it appears that the primary contaminants in the soil are associated with petroleum hydrocarbons, probably from fuel oil. Secondary contamination in the soil from solvent-related VOAs was also found in relatively small amounts. The results of this VOA analysis should be considered questionable, as the soil sample jars were not septum sealed. As such, a map depicting the VOA compounds in the soil was not produced in this report.

5.2.3.3 Base Neutral and Acid Extractables - Base neutral and acid extractable analysis (BNA) was performed on soil samples collected from the NWP plant site during the preliminary sampling

AR300169

Table 5-2

Soil Volatile Organic Results

| CMPD | CL | CMPD-DESC | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | |
| | | POINT | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | |
| | | SAMPLE | S1 0'-6' | | S-1 2' | | S-2 1' | | S-3 1' | | S-3 1.5' | | S-4 2' | | S-4 3' | |
| | | DATE | 07/16/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | |
| | | DEPTH | 0 | | 2' | | 1' | | 1' | | 1.5' | | 2' | | 3' | |
| | | MATRIX | SO | | SO | | SO | | SO | | SO | | SO | | SO | |
| | | V.O.C. LAB I.D. # | 141496 | | 142875 | | 142876 | | 142877 | | 142878 | | 142879 | | 142880 | |
| 203 | V | BENZENE | 1.2 | J B ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | 1.1 | J ug/kg | 1.8 | J ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 205 | V | BROMOFORM | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 206 | V | CARBON TETRACHLORIDE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 207 | V | CHLOROBENZENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 208 | V | DIBROMOCHLOROMETHANE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 209 | V | CHLOROETHANE | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 12 ug/kg | BDL | 12 ug/kg |
| 210 | V | 2-CHLOROETHYLVINYLETHER | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 12 ug/kg | BDL | 12 ug/kg |
| 211 | V | CHLOROFORM | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 212 | V | BROMODICHLOROMETHANE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 214 | V | 1,1-DICHLOROETHANE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 215 | V | 1,2-DICHLOROETHANE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 216 | V | 1,1-DICHLOROETHENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 217 | V | 1,2-DICHLOROPROPANE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 218 | V | CIS-1,3-DICHLOROPROPENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 219 | V | ETHYLBENZENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | 18 | ug/kg | BDL | 5.8 ug/kg | 25 | ug/kg |
| 220 | V | BROMOMETHANE | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 12 ug/kg | BDL | 12 ug/kg |
| 221 | V | CHLOROMETHANE | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 12 ug/kg | BDL | 12 ug/kg |
| 222 | V | METHYLENE CHLORIDE | 26 | B ug/kg | 91 | B ug/kg | 38 | B ug/kg | 12 | B ug/kg | 18 | B ug/kg | 14 | B ug/kg | 10 | B ug/kg |
| 223 | V | 1,1,2,2-TETRACHLOROETHANE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 224 | V | TETRACHLOROETHENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | 1.3 | J ug/kg | 1.1 | J ug/kg | 10 | ug/kg | 5.3 | J ug/kg |
| 225 | V | TOLUENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | 7.3 | ug/kg | 7.5 | ug/kg | 8.6 | ug/kg | 14 | ug/kg |
| 226 | V | TRANS-1,2-DICHLOROETHENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 227 | V | 1,1,1-TRICHLOROETHANE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 228 | V | 1,1,2-TRICHLOROETHANE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 229 | V | TRICHLOROETHENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 231 | V | VINYL CHLORIDE | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 12 ug/kg | BDL | 12 ug/kg |
| 250 | V | TRANS-1,3-DICHLOROPROPENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 251 | V | STYRENE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 252 | V | ACETONE | 12 | B ug/kg | 8.9 | J B ug/kg | 10 | J ug/kg | 41 | B ug/kg | 34 | B ug/kg | 10 | J B ug/kg | 18 | B ug/kg |
| 253 | V | 2-BUTANONE | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | 45 | ug/kg | 16 | ug/kg | BDL | 12 ug/kg | 16 | ug/kg |
| 254 | V | CARBON DISULFIDE | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.6 ug/kg | BDL | 5.8 ug/kg | BDL | 5.8 ug/kg |
| 255 | V | 2-HEXANONE | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 12 ug/kg | BDL | 12 ug/kg |
| 256 | V | 4-METHYL-2-PENTANONE | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 12 ug/kg | BDL | 12 ug/kg |
| 257 | V | VINYL ACETATE | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 11 ug/kg | BDL | 12 ug/kg | BDL | 12 ug/kg |
| 289 | V | XYLENES (TOTAL) | BDL | 5.6 ug/kg | BDL | 5.7 ug/kg | 17 | ug/kg | BDL | 5.6 ug/kg | 140 | ug/kg | 720 | ug/kg | 250 | ug/kg |

Table 5-2 (Cont'd)

Soil Volatile Organic Results

| CMPD | CL | CMPD-DESC | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 04021 | 04021 | 04021 | 04021 | 04021 | 04021 | 04021 |
| | | POINT | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | SAMPLE | S-5 1' | S-6 1' | S-7 1' | S-7 2' | S-7 3' | S-8 17' | S-8 2' |
| | | DATE | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 |
| | | DEPTH | 1' | 1' | 1' | 2' | 3' | 17' | 2' |
| | | MATRIX | SO | SO | SO | SO | SO | SO | SO |
| | | V.O.C. LAB I.D. # | 142881 | 142882 | 142883 | 142884 | 142885 | 142886 | 142887 |
| 203 | V | BENZENE | 38 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | 1.6 J ug/kg | 2.3 J ug/kg | BDL 5.8 ug/kg | 1.4 J ug/kg |
| 205 | V | BROMOFORM | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 206 | V | CARBON TETRACHLORIDE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 207 | V | CHLOROBENZENE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.87 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 208 | V | DIBROMOCHLOROMETHANE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 209 | V | CHLOROETHANE | BDL 18 ug/kg | BDL 12 ug/kg | BDL 11 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg |
| 210 | V | 2-CHLOROETHYLVINYLETHER | BDL 18 ug/kg | BDL 12 ug/kg | BDL 11 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg |
| 211 | V | CHLOROFORM | BDL 9 ug/kg | 2.4 J ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | 1.6 J ug/kg |
| 212 | V | BROMODICHLOROMETHANE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 214 | V | 1,1-DICHLOROETHANE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 215 | V | 1,2-DICHLOROETHANE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 216 | V | 1,1-DICHLOROETHENE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 217 | V | 1,2-DICHLOROPROPANE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 218 | V | CIS-1,3-DICHLOROPROPENE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 219 | V | ETHYLBENZENE | 490 D ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | 7.9 ug/kg | 3.8 J ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 220 | V | BROMOMETHANE | 4.9 J ug/kg | BDL 12 ug/kg | BDL 11 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg |
| 221 | V | CHLOROMETHANE | 15 J ug/kg | BDL 12 ug/kg | BDL 11 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg |
| 222 | V | METHYLENE CHLORIDE | 28 B ug/kg | 15 B ug/kg | 17 B ug/kg | 16 ug/kg | 18 B ug/kg | 22 B ug/kg | 12 B ug/kg |
| 223 | V | 1,1,2,2-TETRACHLOROETHANE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 224 | V | TETRACHLOROETHENE | 7.8 J ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 225 | V | TOLUENE | 390 D ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | 10 ug/kg | 6.1 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 226 | V | TRANS-1,2-DICHLOROETHENE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 227 | V | 1,1,1-TRICHLOROETHANE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 228 | V | 1,1,2-TRICHLOROETHANE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 229 | V | TRICHLOROETHENE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | 3.2 J ug/kg | 3.7 J ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 231 | V | VINYL CHLORIDE | BDL 18 ug/kg | BDL 12 ug/kg | BDL 11 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg |
| 250 | V | TRANS-1,3-DICHLOROPROPENE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 251 | V | STYRENE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 252 | V | ACETONE | 170 B ug/kg | 14 B ug/kg | BDL 11 ug/kg | 12 J ug/kg | 29 B ug/kg | 14 B ug/kg | 8 J B ug/kg |
| 253 | V | 2-BUTANONE | 110 ug/kg | BDL 12 ug/kg | BDL 11 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg |
| 254 | V | CARBON DISULFIDE | BDL 9 ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | BDL 5.9 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg | BDL 5.8 ug/kg |
| 255 | V | 2-HEXANONE | BDL 18 ug/kg | BDL 12 ug/kg | BDL 11 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg |
| 256 | V | 4-METHYL-2-PENTANONE | 39 ug/kg | BDL 12 ug/kg | BDL 11 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg |
| 257 | V | VINYL ACETATE | BDL 18 ug/kg | BDL 12 ug/kg | BDL 11 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg | BDL 12 ug/kg |
| 289 | V | XYLENES (TOTAL) | 2800 D ug/kg | BDL 6.1 ug/kg | BDL 5.7 ug/kg | 8.3 ug/kg | 16 ug/kg | BDL 5.8 ug/kg | 5.1 J ug/kg |

Table 5-2 (Cont'd)

Soil Volatile Organic Results

| | | | |
|---|---|---|---|
| | | SITE | B6021 |
| | | POINT | SOIL |
| | | SAMPLE | S-8 2'DUP |
| | | DATE | 07/23/87 |
| | | DEPTH | 2' |
| | | MATRIX | SO |
| CMPD | CL | CMPD-DESC | |
| | | V.O.C. LAB I.D. # | 142888 |
| 203 | V | BENZENE | BDL 5.8 ug/kg |
| 205 | V | BROMOFORM | BDL 5.8 ug/kg |
| 206 | V | CARBON TETRACHLORIDE | BDL 5.8 ug/kg |
| 207 | V | CHLOROBENZENE | BDL 5.8 ug/kg |
| 208 | V | DIBROMOCHLOROMETHANE | BDL 5.8 ug/kg |
| 209 | V | CHLOROETHANE | BDL 12 ug/kg |
| 210 | V | 2-CHLOROETHYLVINYLETHER | BDL 12 ug/kg |
| 211 | V | CHLOROFORM | 2.7 J ug/kg |
| 212 | V | BROMODICHLOROMETHANE | BDL 5.8 ug/kg |
| 214 | V | 1,1-DICHLOROETHANE | BDL 5.8 ug/kg |
| 215 | V | 1,2-DICHLOROETHANE | BDL 5.8 ug/kg |
| 216 | V | 1,1-DICHLOROETHENE | BDL 5.8 ug/kg |
| 217 | V | 1,2-DICHLOROPROPANE | BDL 5.8 ug/kg |
| 218 | V | CIS-1,3-DICHLOROPROPENE | BDL 5.8 ug/kg |
| 219 | V | ETHYLBENZENE | BDL 5.8 ug/kg |
| 220 | V | BROMOMETHANE | BDL 12 ug/kg |
| 221 | V | CHLOROMETHANE | BDL 12 ug/kg |
| 222 | V | METHYLENE CHLORIDE | 9.4 8 ug/kg |
| 223 | V | 1,1,2,2-TETRACHLOROETHANE | BDL 5.8 ug/kg |
| 224 | V | TETRACHLOROETHENE | BDL 5.8 ug/kg |
| 225 | V | TOLUENE | BDL 5.8 ug/kg |
| 226 | V | TRANS-1,2-DICHLOROETHENE | BDL 5.8 ug/kg |
| 227 | V | 1,1,1-TRICHLOROETHANE | BDL 5.8 ug/kg |
| 228 | V | 1,1,2-TRICHLOROETHANE | BDL 5.8 ug/kg |
| 229 | V | TRICHLOROETHENE | BDL 5.8 ug/kg |
| 231 | V | VINYL CHLORIDE | BDL 12 ug/kg |
| 250 | V | TRANS-1,3-DICHLOROPROPENE | BDL 5.8 ug/kg |
| 251 | V | STYRENE | BDL 5.8 ug/kg |
| 252 | V | ACETONE | 11 8 ug/kg |
| 253 | V | 2-BUTANONE | BDL 12 ug/kg |
| 254 | V | CARBON DISULFIDE | BDL 5.8 ug/kg |
| 255 | V | 2-HEXANONE | BDL 12 ug/kg |
| 256 | V | 4-METHYL-2-PENTANONE | BDL 12 ug/kg |
| 257 | V | VINYL ACETATE | BDL 12 ug/kg |
| 289 | V | XYLENES (TOTAL) | 5.1 J ug/kg |

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round. The results shown in Table 5-3 indicate substantial contamination by BNA chemicals. The BNA compounds detected most frequently and in the highest concentrations were (in decreasing order) pentachlorophenol, 2-methylnaphthalene, naphthalene, phenanthrene, and fluorene. Other BNA compounds frequently found, however, in somewhat lower concentrations, were acenaphthene, pyrene, fluoranthene, and bis(2-ethylhexyl) phthalate.

Soil sample location S-5 had the greatest total concentration of BNA compounds with 6,195,100 ug/kg (see Figure 5-5). The concentration of PCP at this location was 4,500,000 ug/kg and constituted the greatest portion of this total BNA concentration. Soil sample location S-4 also had a significant total concentration of BNA compounds with 713,800 ug/kg detected at the 3-foot depth interval. These elevated concentrations occurred in and around the chemical storage tank area and reflect the contamination present in this area. Concentrations of BNA compounds at other soil sample locations on the site, although not as elevated as those previously mentioned, are significant and reflect the widespread contamination of soil on NWP property. Concentrations of BNA compounds at those soil sample locations not located in the area of the chemical storage tanks could be due in part to the saturation of soils from treated lumber stored in those areas.

Generalizations concerning the BNA analysis include a trend toward increased concentrations with depth, as was evident at those locations in which incremental samples were able to be obtained. PCP concentrations constituted the largest portion of the total BNA concentrations in all of the samples except S-1,

Table 5-3

Soil Base Neutral/Acid Extractable Results

| CMPD | CL | CMPD-DESC | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| | | POINT | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | SAMPLE | S1 0"-6" | S-1 2' | S-2 1' | S-3 1' | S-3 1.5' | S-4 2' | S-4 3' |
| | | DATE | 07/16/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 |
| | | DEPTH | 0 | 2' | 1' | 1' | 1.5' | 2' | 3' |
| | | MATRIX | SO | SO | SO | SO | SO | SO | SO |
| | | ACID EXTRACT/ BASE NEUT. LAB ID # | 141496 | 142875 | 142876 | 142877 | 142878 | 142879 | 142880 |
| 401 | B | ACENAPHTHENE | BDL 390 ug/kg | 9200 D ug/kg | 5400 ug/kg | 4700 ug/kg | 14000 J ug/kg | 5600 J ug/kg | 6100 J ug/kg |
| 402 | B | ACENAPHTHYLENE | BDL 390 ug/kg | 120 J ug/kg | 730 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 403 | B | ANTHRACENE | BDL 390 ug/kg | 4200 ug/kg | 2400 ug/kg | 1800 J ug/kg | 7800 J ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 405 | B | BENZO(A)ANTHRACENE | BDL 390 ug/kg | 4000 D ug/kg | 6500 ug/kg | 1800 J ug/kg | 7500 J ug/kg | 2600 J ug/kg | 3300 J ug/kg |
| 406 | B | BENZO(A)PYRENE | 120 J ug/kg | 3400 ug/kg | 4700 ug/kg | 1200 J ug/kg | 2400 J ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 407 | B | BENZO(B)FLUORANTHENE | 330 J ug/kg | 2800 D ug/kg | 10000 D ug/kg | 3300 ug/kg | 4200 J ug/kg | 3700 J ug/kg | 3300 J ug/kg |
| 408 | B | BENZO(G,H,I)PERYLENE | BDL 390 ug/kg | 1700 ug/kg | 3100 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 409 | B | BENZO(K)FLUORANTHENE | 330 J ug/kg | 2800 D ug/kg | 10000 D ug/kg | 3300 ug/kg | 4200 J ug/kg | 3700 J ug/kg | 3300 J ug/kg |
| 410 | B | BIS(-2-CHLOROETHOXY)METHANE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 411 | B | BIS(-2-CHLOROETHYL)ETHER | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 412 | B | BIS(2-CHLOROISOPROPYL)ETHER | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 413 | B | BIS(2-ETHYLHEXYL)PHTHALATE | 280 J ug/kg | 270 J ug/kg | 1700 ug/kg | 2700 ug/kg | 4400 J ug/kg | 5800 J ug/kg | 6600 J ug/kg |
| 414 | B | 4-BROMOPHENYL-PHENYLETHER | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 415 | B | BUTYLBENZYLPHTHALATE | 120 J ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | 360 J ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 416 | B | 2-CHLORONAPHTHALENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 417 | B | 4-CHLOROPHENYL-PHENYLETHER | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 418 | B | CHRYSENE | 130 J ug/kg | 5000 ug/kg | 6100 ug/kg | 2800 ug/kg | 10000 J ug/kg | 4000 J ug/kg | 4200 J ug/kg |
| 419 | B | DIBENZ(A,H)ANTHRACENE | BDL 390 ug/kg | 810 ug/kg | 1600 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 420 | B | 1,2-DICHLOROBENZENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 421 | B | 1,3-DICHLOROBENZENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 422 | B | 1,4-DICHLOROBENZENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 423 | B | 3,3'-DICHLOROBENZIDINE | BDL 770 ug/kg | BDL 770 ug/kg | BDL 750 ug/kg | BDL 3800 ug/kg | BDL 44000 ug/kg | BDL 47000 ug/kg | BDL 47000 ug/kg |
| 424 | B | DIETHYLPHTHALATE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 425 | B | DIMETHYL PHTHALATE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 426 | B | DI-N-BUTYLPHTHALATE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 427 | B | 2,4-DINITROTOLUENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 428 | B | 2,6-DINITROTOLUENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 429 | B | DI-N-OCTYL PHTHALATE | 140 J ug/kg | BDL 380 ug/kg | 490 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |

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Table 5-3 (Cont'd)

Soil Base Neutral/Acid Extractable Results

| CMPD | CL | CMPD-DESC | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| | | POINT | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | | SAMPLE | S1 0"-6" | S-1 2' | S-2 1' | S-3 1' | S-3 1.5' | S-4 2' | S-4 3' |
| | | DATE | 07/16/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 |
| | | DEPTH | 0 | 2' | 1' | 1' | 1.5' | 2' | 3' |
| | | MATRIX | SO | SO | SO | SO | SO | SO | SO |
| | | ACID EXTRACT/ BASE NEUT. LAB ID # | 141496 | 142875 | 142876 | 142877 | 142878 | 142879 | 142880 |
| 431 | B | FLUORANTHENE | 150 J ug/kg | 18000 D ug/kg | 7100 D ug/kg | 6800 ug/kg | 32000 ug/kg | 10000 J ug/kg | 10000 J ug/kg |
| 432 | B | FLUORENE | BDL 390 ug/kg | 7800 D ug/kg | 3600 ug/kg | 4500 ug/kg | 18000 J ug/kg | 7200 J ug/kg | 8000 J ug/kg |
| 433 | B | HEXACHLOROBENZENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 434 | B | HEXACHLOROBUTADIENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 435 | B | HEXACHLOROCYCLOPENTADIENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 436 | B | HEXACHLOROETHANE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 437 | B | INDENO(1,2,3-CD)PYRENE | BDL 390 ug/kg | 1800 ug/kg | 3000 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 438 | B | ISOPHORONE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 439 | B | NAPHTHALENE | BDL 390 ug/kg | 7700 D ug/kg | 6200 ug/kg | 6600 ug/kg | 25000 ug/kg | 19000 J ug/kg | 10000 J ug/kg |
| 440 | B | NITROBENZENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 442 | B | N-NITROSO-DI-N-PROPYLAMINE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 443 | B | N-NITROSODIPHENYLAMINE(1) | BDL 390 ug/kg | BDL 380 ug/kg | 7300 D ug/kg | 8600 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 444 | B | PHENANTHRENE | 46 J ug/kg | 19000 D ug/kg | 7200 D ug/kg | 16000 ug/kg | 61000 ug/kg | 21000 J ug/kg | 26000 ug/kg |
| 445 | B | PYRENE | 140 J ug/kg | 12000 D ug/kg | 11000 D ug/kg | 11000 ug/kg | 37000 ug/kg | 15000 J ug/kg | 14000 ug/kg |
| 446 | B | 1,2,4-TRICHLOROBENZENE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 456 | B | 1,2,3,4-TETRACHLOROBENZENE | NA | NA | NA | NA | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 474 | B | BENZYL ALCOHOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 475 | B | 4-CHLOROANILINE | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 476 | B | DIBENZOFURAN | BDL 390 ug/kg | 6800 ug/kg | 1600 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | 4000 J ug/kg | BDL 23000 ug/kg |
| 477 | B | 2-METHYLNAPHTHALENE | BDL 390 ug/kg | 5100 ug/kg | 3200 ug/kg | 4400 ug/kg | 17000 J ug/kg | 20000 J ug/kg | 19000 J ug/kg |
| 478 | B | 2-NITROANILINE | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 9400 ug/kg | BDL 110000 ug/kg | BDL 120000 ug/kg | BDL 120000 ug/kg |
| 479 | B | 3-NITROANILINE | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 9400 ug/kg | BDL 110000 ug/kg | BDL 120000 ug/kg | BDL 120000 ug/kg |
| 480 | B | 4-NITROANILINE | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 9400 ug/kg | BDL 110000 ug/kg | BDL 120000 ug/kg | BDL 120000 ug/kg |
| 601 | A | 2-CHLOROPHENOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 602 | A | 2,4-DICHLOROPHENOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 603 | A | 2,4-DIMETHYLPHENOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 604 | A | 4,6-DINITRO-2-METHYLPHENOL | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 9400 ug/kg | BDL 110000 ug/kg | BDL 120000 ug/kg | BDL 120000 ug/kg |
| 605 | A | 2,4-DINITROPHENOL | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 9400 ug/kg | BDL 110000 ug/kg | BDL 120000 ug/kg | BDL 120000 ug/kg |
| 606 | A | 2-NITROPHENOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 607 | A | 4-NITROPHENOL | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 9400 ug/kg | BDL 110000 ug/kg | BDL 120000 ug/kg | BDL 120000 ug/kg |
| 608 | A | 4-CHLORO-3-METHYLPHENOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 609 | A | PENTACHLOROPHENOL | 1000 J ug/kg | 780 J ug/kg | 19000 D ug/kg | 130000 D ug/kg | 120000 ug/kg | 270000 ug/kg | 600000 D ug/kg |
| 610 | A | PHENOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 611 | A | 2,4,6-TRICHLOROPHENOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 620 | A | 2-METHYLPHENOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 622 | A | 4-METHYLPHENOL | BDL 390 ug/kg | BDL 380 ug/kg | BDL 370 ug/kg | BDL 1900 ug/kg | BDL 22000 ug/kg | BDL 23000 ug/kg | BDL 23000 ug/kg |
| 625 | A | BENZOIC ACID | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 9400 ug/kg | BDL 110000 ug/kg | BDL 120000 ug/kg | BDL 120000 ug/kg |
| 626 | A | 2,4,5-TRICHLOROPHENOL | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 1900 ug/kg | BDL 9400 ug/kg | BDL 110000 ug/kg | BDL 120000 ug/kg | BDL 120000 ug/kg |

Table 5-3 (Cont'd)

Soil Base Neutral/Acid Extractable Results

| CMPD CL CMPD-DESC | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| SAMPLE | S-5 1' | S-6 1' | S-7 1' | S-7 2' | S-7 3' | S-8 17' | S-8 2' |
| DATE | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 |
| DEPTH | 1' | 1' | 1' | 2' | 3' | 17' | 2' |
| MATRIX | SO | SO | SO | SO | SO | SO | SO |
| ACID EXTRACT/ BASE NEUT. LAB ID # | 142881 | 142882 | 142883 | 142884 | 142885 | 142886 | 142887 |
| 401 B ACENAPHTHENE | 73000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | 2400 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | 6100 ug/kg |
| 402 B ACENAPHTHYLENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 403 B ANTHRACENE | 17000 J ug/kg | BDL 24000 ug/kg | 94 J ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | 3200 ug/kg |
| 405 B BENZO(A)ANTHRACENE | 8700 J ug/kg | 3200 J ug/kg | 140 J ug/kg | 250 J ug/kg | 90 J ug/kg | 8200 ug/kg | 8700 ug/kg |
| 406 B BENZO(A)PYRENE | BDL 36000 ug/kg | BDL 24000 ug/kg | 190 J ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | 5000 ug/kg | 6200 ug/kg |
| 407 B BENZO(B)FLUORANTHENE | 7200 J ug/kg | 4900 ug/kg | 540 ug/kg | 430 J ug/kg | BDL 390 ug/kg | 19000 D ug/kg | 10000 ug/kg |
| 408 B BENZO(G,H,I)PERYLENE | BDL 36000 ug/kg | BDL 24000 ug/kg | 45 J ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | 2300 ug/kg | 2100 ug/kg |
| 409 B BENZO(K)FLUORANTHENE | 7200 J ug/kg | 4900 ug/kg | 540 ug/kg | 660 J ug/kg | BDL 390 ug/kg | 19000 D ug/kg | 10000 ug/kg |
| 410 B BIS(-2-CHLOROETHOXY)METHANE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 411 B BIS(-2-CHLOROETHYL)ETHER | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 412 B BIS(2-CHLOROISOPROPYL)ETHER | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 413 B BIS(2-ETHYLHEXYL)PHTHALATE | 34000 J ug/kg | 2700 J ug/kg | 1600 ug/kg | 660 J ug/kg | BDL 390 ug/kg | 7200 ug/kg | 5600 ug/kg |
| 414 B 4-BROMOPHENYL-PHENYLETHER | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 415 B BUTYLBENZYLPHTHALATE | 15000 J ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | 730 J ug/kg | BDL 790 ug/kg |
| 416 B 2-CHLORONAPHTHALENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 417 B 4-CHLOROPHENYL-PHENYLETHER | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 418 B CHRYSENE | 14000 36000 ug/kg | 4600 J ug/kg | 230 J ug/kg | 410 J ug/kg | 130 J ug/kg | 8900 ug/kg | 9800 ug/kg |
| 419 B DIBENZ(A,H)ANTHRACENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | 1200 ug/kg | 1100 ug/kg |
| 420 B 1,2-DICHLOROBENZENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 421 B 1,3-DICHLOROBENZENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 422 B 1,4-DICHLOROBENZENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 423 B 3,3'-DICHLOROBENZIDINE | BDL 72000 ug/kg | BDL 49000 ug/kg | BDL 750 ug/kg | BDL 3900 ug/kg | BDL 790 ug/kg | BDL 1600 ug/kg | BDL 1600 ug/kg |
| 424 B DIETHYLPHTHALATE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 425 B DIMETHYL PHTHALATE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 426 B DI-N-BUTYLPHTHALATE | BDL 36000 ug/kg | BDL 24000 ug/kg | 570 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 427 B 2,4-DINITROTOLUENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 428 B 2,6-DINITROTOLUENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 429 B DI-N-OCTYL PHTHALATE | BDL 36000 ug/kg | BDL 24000 ug/kg | 86 J ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |

Page 5-3 (Cont'd)

Soil Base Neutral/Acid Extractable Results

| | SITE | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
|---|---|---|---|---|---|---|---|---|
| | POINT | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL | SOIL |
| | SAMPLE | S-5 1' | S-6 1' | S-7 1' | S-7 2' | S-7 3' | S-8 17' | S-8 2' |
| | DATE | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 | 07/23/87 |
| | DEPTH | 1' | 1' | 1' | 2' | 3' | 17' | 2' |
| | MATRIX | SO | SO | SO | SO | SO | SO | SO |
| CMPD CL | CMPD-DESC | | | | | | | |
| | ACID EXTRACT/ BASE NEUT. LAB ID # | 142881 | 142882 | 142883 | 142884 | 142885 | 142886 | 142887 |
| | ================================ | ====== | ====== | ====== | ====== | ====== | ====== | ====== |
| 431 B | FLUORANTHENE | 30000 J ug/kg | 7600 J ug/kg | 160 J ug/kg | 640 J ug/kg | 220 J ug/kg | 30000 D ug/kg | 37000 D ug/kg |
| 432 B | FLUORENE | 120000 ug/kg | BDL 24000 ug/kg | 90 J ug/kg | BDL 1900 ug/kg | 720 ug/kg | BDL 790 ug/kg | 9000 ug/kg |
| 433 B | HEXACHLOROBENZENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 434 B | HEXACHLOROBUTADIENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 435 B | HEXACHLOROCYCLOPENTADIENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 436 B | HEXACHLOROETHANE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 437 B | INDENO(1,2,3-CD)PYRENE | BDL 36000 ug/kg | BDL 24000 ug/kg | 75 J ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | 2500 ug/kg | 2300 ug/kg |
| 438 B | ISOPHORONE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 439 B | NAPHTHALENE | 340000 ug/kg | BDL 24000 ug/kg | 450 ug/kg | 51000 D ug/kg | 18000 J D ug/kg | 1400 ug/kg | 7300 ug/kg |
| 440 B | NITROBENZENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 442 B | N-NITROSO-DI-N-PROPYLAMINE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 443 B | N-NITROSODIPHENYLAMINE(1) | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 444 B | PHENANTHRENE | 250000 ug/kg | 13000 J ug/kg | 150 J ug/kg | 2200 ug/kg | 550 ug/kg | 21000 D ug/kg | 36000 D ug/kg |
| 445 B | PYRENE | 58000 ug/kg | 13000 J ug/kg | 290 J ug/kg | 1200 J ug/kg | 300 J ug/kg | 35000 D ug/kg | 30000 D ug/kg |
| 446 B | 1,2,4-TRICHLOROBENZENE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 456 B | 1,2,3,4-TETRACHLOROBENZENE | BDL 36000 ug/kg | BDL 24000 ug/kg | NA | NA | NA | NA | NA |
| 474 B | BENZYL ALCOHOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 475 B | 4-CHLOROANILINE | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 476 B | DIBENZOFURAN | 71000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | 970 J ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 477 B | 2-METHYLNAPHTHALENE | 650000 J ug/kg | BDL 24000 ug/kg | 800 ug/kg | 98000 D ug/kg | 38000 D ug/kg | 3800 ug/kg | 7800 ug/kg |
| 478 B | 2-NITROANILINE | BDL 180000 ug/kg | BDL 120000 ug/kg | BDL 1900 ug/kg | BDL 9700 ug/kg | BDL 2000 ug/kg | BDL 4000 ug/kg | BDL 4000 ug/kg |
| 479 B | 3-NITROANILINE | BDL 180000 ug/kg | BDL 120000 ug/kg | BDL 1900 ug/kg | BDL 9700 ug/kg | BDL 2000 ug/kg | BDL 4000 ug/kg | BDL 4000 ug/kg |
| 480 B | 4-NITROANILINE | BDL 180000 ug/kg | BDL 120000 ug/kg | BDL 1900 ug/kg | BDL 9700 ug/kg | BDL 2000 ug/kg | BDL 4000 ug/kg | BDL 4000 ug/kg |
| 401 A | 2-CHLOROPHENOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 402 A | 2,4-DICHLOROPHENOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | 430 J ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 403 A | 2,4-DIMETHYLPHENOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 404 A | 4,6-DINITRO-2-METHYLPHENOL | BDL 180000 ug/kg | BDL 120000 ug/kg | BDL 1900 ug/kg | BDL 9700 ug/kg | BDL 2000 ug/kg | BDL 4000 ug/kg | BDL 4000 ug/kg |
| 405 A | 2,4-DINITROPHENOL | BDL 180000 ug/kg | BDL 120000 ug/kg | BDL 1900 ug/kg | BDL 9700 ug/kg | BDL 2000 ug/kg | BDL 4000 ug/kg | BDL 4000 ug/kg |
| 606 A | 2-NITROPHENOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 607 A | 4-NITROPHENOL | BDL 180000 ug/kg | BDL 120000 ug/kg | BDL 1900 ug/kg | BDL 9700 ug/kg | BDL 2000 ug/kg | BDL 4000 ug/kg | BDL 4000 ug/kg |
| 608 A | 4-CHLORO-3-METHYLPHENOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 609 A | PENTACHLOROPHENOL | 4500000 D ug/kg | 7300 J ug/kg | 2500 ug/kg | 32000 D ug/kg | 140000 D ug/kg | 180000 D ug/kg | 250000 D ug/kg |
| 610 A | PHENOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 611 A | 2,4,6-TRICHLOROPHENOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 620 A | 2-METHYLPHENOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 622 A | 4-METHYLPHENOL | BDL 36000 ug/kg | BDL 24000 ug/kg | BDL 380 ug/kg | BDL 1900 ug/kg | BDL 390 ug/kg | BDL 790 ug/kg | BDL 790 ug/kg |
| 625 A | BENZOIC ACID | BDL 180000 ug/kg | BDL 120000 ug/kg | BDL 1900 ug/kg | BDL 9700 ug/kg | BDL 2000 ug/kg | BDL 4000 ug/kg | BDL 4000 ug/kg |
| 626 A | 2,4,5-TRICHLOROPHENOL | BDL 180000 ug/kg | BDL 120000 ug/kg | BDL 1900 ug/kg | BDL 9700 ug/kg | BDL 2000 ug/kg | BDL 4000 ug/kg | BDL 4000 ug/kg |

Table 5-3 (Cont'd)

Soil Base Neutral/Acid Extractable Results

| CMPD | CL | CMPD-DESC | | | |
|---|---|---|---|---|---|
| | | SITE | 86021 | | |
| | | POINT | SOIL | | |
| | | SAMPLE | S-8 2'DUP | | |
| | | DATE | 07/23/87 | | |
| | | DEPTH | 2' | | |
| | | MATRIX | SO | | |
| | | ACID EXTRACT/ BASE NEUT. LAB ID # | 142888 | | |
| | | ================================ | ====== | | |
| 401 | B | ACENAPHTHENE | 5500 | | ug/kg |
| 402 | B | ACENAPHTHYLENE | BDL | 790 | ug/kg |
| 403 | B | ANTHRACENE | 2200 | | ug/kg |
| 405 | B | BENZO(A)ANTHRACENE | 10000 | | ug/kg |
| 406 | B | BENZO(A)PYRENE | 7200 | | ug/kg |
| 407 | B | BENZO(B)FLUORANTHENE | 12000 | | ug/kg |
| 408 | B | BENZO(G,H,I)PERYLENE | 2400 | | ug/kg |
| 409 | B | BENZO(K)FLUORANTHENE | 12000 | | ug/kg |
| 410 | B | BIS(-2-CHLOROETHOXY)METHANE | BDL | 790 | ug/kg |
| 411 | B | BIS(-2-CHLOROETHYL)ETHER | BDL | 790 | ug/kg |
| 412 | B | BIS(2-CHLOROISOPROPYL)ETHER | BDL | 790 | ug/kg |
| 413 | B | BIS(2-ETHYLHEXYL)PHTHALATE | 7000 | | ug/kg |
| 414 | B | 4-BROMOPHENYL-PHENYLETHER | BDL | 790 | ug/kg |
| 415 | B | BUTYLBENZYLPHTHALATE | 850 | | ug/kg |
| 416 | B | 2-CHLORONAPHTHALENE | BDL | 790 | ug/kg |
| 417 | B | 4-CHLOROPHENYL-PHENYLETHER | BDL | 790 | ug/kg |
| 418 | B | CHRYSENE | 11000 | | ug/kg |
| 419 | B | DIBENZ(A,H)ANTHRACENE | 1400 | | ug/kg |
| 420 | B | 1,2-DICHLOROBENZENE | BDL | 790 | ug/kg |
| 421 | B | 1,3-DICHLOROBENZENE | BDL | 790 | ug/kg |
| 422 | B | 1,4-DICHLOROBENZENE | BDL | 790 | ug/kg |
| 423 | B | 3,3'-DICHLOROBENZIDINE | BDL | 1600 | ug/kg |
| 424 | B | DIETHYLPHTHALATE | BDL | 790 | ug/kg |
| 425 | B | DIMETHYL PHTHALATE | BDL | 790 | ug/kg |
| 426 | B | DI-N-BUTYLPHTHALATE | BDL | 790 | ug/kg |
| 427 | B | 2,4-DINITROTOLUENE | BDL | 790 | ug/kg |
| 428 | B | 2,6-DINITROTOLUENE | BDL | 790 | ug/kg |
| 429 | B | DI-N-OCTYL PHTHALATE | BDL | 790 | ug/kg |

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Table 5-3 (Cont'd)

Soil Base Neutral/Acid Extractable Results

| CMPD | CL | CMPD-DESC | | | |
|---|---|---|---|---|---|
| | | SITE | 86021 | | |
| | | POINT | SOIL | | |
| | | SAMPLE | S-8 2'DUP | | |
| | | DATE | 07/23/87 | | |
| | | DEPTH | 2' | | |
| | | MATRIX | SO | | |
| | | ACID EXTRACT/ BASE NEUT. LAB ID # | 142888 | | |
| | | ================================ | ====== | | |
| 431 | B | FLUORANTHENE | 35000 | D | ug/kg |
| 432 | B | FLUORENE | 8900 | | ug/kg |
| 433 | B | HEXACHLOROBENZENE | BDL | 790 | ug/kg |
| 434 | B | HEXACHLOROBUTADIENE | BDL | 790 | ug/kg |
| 435 | B | HEXACHLOROCYCLOPENTADIENE | BDL | 790 | ug/kg |
| 436 | B | HEXACHLOROETHANE | BDL | 790 | ug/kg |
| 437 | B | INDENO(1,2,3-CD)PYRENE | 2800 | | ug/kg |
| 438 | B | ISOPHORONE | BDL | 790 | ug/kg |
| 439 | B | NAPHTHALENE | 1600 | | ug/kg |
| 440 | B | NITROBENZENE | BDL | 790 | ug/kg |
| 442 | B | N-NITROSO-DI-N-PROPYLAMINE | BDL | 790 | ug/kg |
| 443 | B | N-NITROSODIPHENYLAMINE(1) | BDL | 790 | ug/kg |
| 444 | B | PHENANTHRENE | 31000 | D | ug/kg |
| 445 | B | PYRENE | 39000 | | ug/kg |
| 446 | B | 1,2,4-TRICHLOROBENZENE | BDL | 790 | ug/kg |
| 456 | B | 1,2,3,4-TETRACHLOROBENZENE | NA | | |
| 474 | B | BENZYL ALCOHOL | BDL | 790 | ug/kg |
| 475 | B | 4-CHLOROANILINE | BDL | 790 | ug/kg |
| 476 | B | DIBENZOFURAN | 5100 | | ug/kg |
| 477 | B | 2-METHYLNAPHTHALENE | 3800 | | ug/kg |
| 478 | B | 2-NITROANILINE | BDL | 4000 | ug/kg |
| 479 | B | 3-NITROANILINE | BDL | 4000 | ug/kg |
| 480 | B | 4-NITROANILINE | BDL | 4000 | ug/kg |
| 601 | A | 2-CHLOROPHENOL | BDL | 790 | ug/kg |
| 602 | A | 2,4-DICHLOROPHENOL | BDL | 790 | ug/kg |
| 603 | A | 2,4-DIMETHYLPHENOL | BDL | 790 | ug/kg |
| 604 | A | 4,6-DINITRO-2-METHYLPHENOL | BDL | 4000 | ug/kg |
| 605 | A | 2,4-DINITROPHENOL | BDL | 4000 | ug/kg |
| 606 | A | 2-NITROPHENOL | BDL | 790 | ug/kg |
| 607 | A | 4-NITROPHENOL | BDL | 4000 | ug/kg |
| 608 | A | 4-CHLORO-3-METHYLPHENOL | BDL | 790 | ug/kg |
| 609 | A | PENTACHLOROPHENOL | 190000 | D | ug/kg |
| 610 | A | PHENOL | BDL | 790 | ug/kg |
| 611 | A | 2,4,6-TRICHLOROPHENOL | BDL | 790 | ug/kg |
| 620 | A | 2-METHYLPHENOL | BDL | 790 | ug/kg |
| 622 | A | 4-METHYLPHENOL | BDL | 790 | ug/kg |
| 625 | A | BENZOIC ACID | BDL | 4000 | ug/kg |
| 626 | A | 2,4,5-TRICHLOROPHENOL | BDL | 4000 | ug/kg |

AR300179

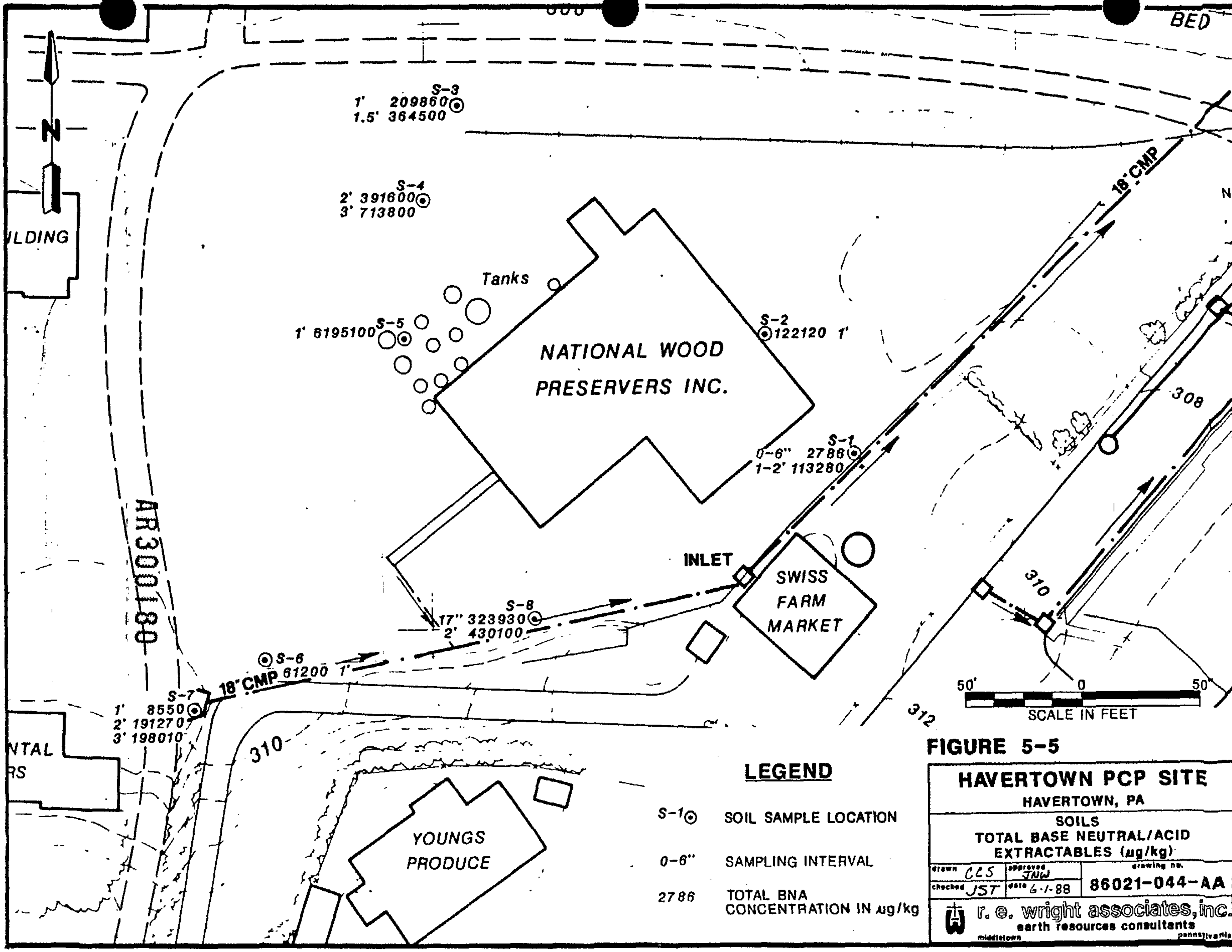
BED
N
LDING
NTAL
RS
S-3
1' 209860
1.5' 364500
S-4
2' 391600
3' 713800
Tanks
S-5
1' 6195100
NATIONAL WOOD
PRESERVERS INC.
S-2
122120 1'
S-1
0-6" 2786
1-2' 113280
18" CMP
308
INLET
SWISS
FARM
MARKET
310
S-8
17" 323930
2' 430100
S-6
61200 1'
18" CMP
S-7
1' 8550
2' 191270
3' 198010
310
312
50' 0 50'
SCALE IN FEET
YOUNGS
PRODUCE
LEGEND
S-1 SOIL SAMPLE LOCATION
0-6" SAMPLING INTERVAL
2786 TOTAL BNA CONCENTRATION IN µg/kg
HAVERTOWN PCP SITE
HAVERTOWN, PA
SOILS
TOTAL BASE NEUTRAL/ACID EXTRACTABLES (µg/kg)
drawn CLS
approved JNW
checked JST
date 6-1-88
drawing no. 86021-044-AA
r. e. wright associates, inc.
earth resources consultants
middletown pennsylvania

FIGURE 5-5

S-6, and S-7. Also, PCP concentrations increased with depth as was evident at soil sample locations S-4, S-7, and S-8.

5.2.3.4 Pesticides and PCBs - Pesticide and polychlorinated biphenyl analyses were performed on soil samples collected from eight locations at NWP during the preliminary sampling round. The results shown in Table 5-4 indicate that PCB-1260 was detected at a depth of one foot in soil sample S-2 at a concentration of 1600 ug/kg. This sampling point was located on the northern building face of the wood-preserving plant and was the only sample in which PCBs were found above detection limits.

Beta-BHC and chlordane were the only pesticides which were detected in soil samples at NWP. Beta-BHC was detected at soil sample location S-3 at depths of 1 foot and 1.5 feet, at concentrations of 660 ug/kg and 1300 ug/kg respectively. Chlordane was detected at soil sample location S-8 at depths of 17 inches and 2 feet at concentrations of 1000 ug/kg and 1200 ug/kg. The approximate locations of these soil samples are shown on Figure 5-6.

5.2.3.5 Cyanide and Oil and Grease - Soil samples were analyzed for cyanide and oil and grease. The results of these analyses are provided in Table 5-4. Cyanide was not detected in any of the samples.

Concentrations of oil and grease were detected in every soil sample, with the highest concentration, 560,000 mg/kg, detected in soil sample S-5. Soil sample S-5 was collected in the storage tank area situated on the west side of the wood-preserving plant. This area was highly saturated with oily fluids, which either are or were stored in the tanks. As would be expected,

# Table 5-4
## Soil Pesticide/PCB and Oil and Grease and Cyanide Results

| CMPD | CL | CMPD-DESC | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | |
| | | POINT | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | |
| | | SAMPLE | S1 0"-6" | | S-1 2' | | S-2 1' | | S-3 1' | | S-3 1.5' | | S-4 2' | | S-4 3' | |
| | | DATE | 07/16/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | |
| | | DEPTH | 0 | | 2' | | 1' | | 1' | | 1.5' | | 2' | | 3' | |
| | | MATRIX | SO | | SO | | SO | | SO | | SO | | SO | | SO | |
| | | PESTICIDE/ PCB'S LAB I.D. # | 141496 | | 142875 | | 142876 | | 142877 | | 142878 | | 142879 | | 142880 | |
| 701 | P | ALDRIN | BDL | 9 ug/kg | BDL | 9.1 ug/kg | BDL | 35 ug/kg | BDL | 130 ug/kg | BDL | 130 ug/kg | BDL | 140 ug/kg | BDL | 140 ug/kg |
| 702 | P | ALPHA-BHC | BDL | 9 ug/kg | BDL | 9.1 ug/kg | BDL | 35 ug/kg | BDL | 130 ug/kg | BDL | 130 ug/kg | BDL | 140 ug/kg | BDL | 140 ug/kg |
| 703 | P | BETA-BHC | BDL | 9 ug/kg | BDL | 9.1 ug/kg | BDL | 35 ug/kg | 660 | ug/kg | 1300 | ug/kg | BDL | 140 ug/kg | BDL | 140 ug/kg |
| 704 | P | GAMMA-BHC | BDL | 9 ug/kg | BDL | 9.1 ug/kg | BDL | 35 ug/kg | BDL | 130 ug/kg | BDL | 130 ug/kg | BDL | 140 ug/kg | BDL | 140 ug/kg |
| 705 | P | DELTA-BHC | BDL | 9 ug/kg | BDL | 9.1 ug/kg | BDL | 35 ug/kg | BDL | 130 ug/kg | BDL | 130 ug/kg | BDL | 140 ug/kg | BDL | 140 ug/kg |
| 706 | P | CHLORDANE | BDL | 90 ug/kg | BDL | 91 ug/kg | BDL | 350 ug/kg | BDL | 1300 ug/kg | BDL | 1300 ug/kg | BDL | 1400 ug/kg | BDL | 1400 ug/kg |
| 707 | P | 4,4'-DDT | BDL | 18 ug/kg | BDL | 18 ug/kg | BDL | 71 ug/kg | BDL | 270 ug/kg | BDL | 270 ug/kg | BDL | 280 ug/kg | BDL | 280 ug/kg |
| 708 | P | 4,4'-DDE | BDL | 18 ug/kg | BDL | 18 ug/kg | BDL | 71 ug/kg | BDL | 270 ug/kg | BDL | 270 ug/kg | BDL | 280 ug/kg | BDL | 280 ug/kg |
| 709 | P | 4,4'-DDD | BDL | 18 ug/kg | BDL | 18 ug/kg | BDL | 71 ug/kg | BDL | 270 ug/kg | BDL | 270 ug/kg | BDL | 280 ug/kg | BDL | 280 ug/kg |
| 710 | P | DIELDRIN | BDL | 18 ug/kg | BDL | 18 ug/kg | BDL | 71 ug/kg | BDL | 270 ug/kg | BDL | 270 ug/kg | BDL | 280 ug/kg | BDL | 280 ug/kg |
| 711 | P | ALPHA-ENDOSULFAN | BDL | 9 ug/kg | BDL | 9.1 ug/kg | BDL | 35 ug/kg | BDL | 130 ug/kg | BDL | 130 ug/kg | BDL | 140 ug/kg | BDL | 140 ug/kg |
| 712 | P | BETA-ENDOSULFAN | BDL | 18 ug/kg | BDL | 18 ug/kg | BDL | 71 ug/kg | BDL | 270 ug/kg | BDL | 270 ug/kg | BDL | 280 ug/kg | BDL | 280 ug/kg |
| 713 | P | ENDOSULFAN SULFATE | BDL | 18 ug/kg | BDL | 18 ug/kg | BDL | 71 ug/kg | BDL | 270 ug/kg | BDL | 270 ug/kg | BDL | 280 ug/kg | BDL | 280 ug/kg |
| 714 | P | ENDRIN | BDL | 18 ug/kg | BDL | 18 ug/kg | BDL | 71 ug/kg | BDL | 270 ug/kg | BDL | 270 ug/kg | BDL | 280 ug/kg | BDL | 280 ug/kg |
| 715 | P | ENDRIN ALDEHYDE | NA | | NA | | NA | | BDL | 2700 ug/kg | BDL | 2700 ug/kg | BDL | 2800 ug/kg | BDL | 2800 ug/kg |
| 716 | P | HEPTACHLOR | BDL | 9 ug/kg | BDL | 9.1 ug/kg | BDL | 35 ug/kg | BDL | 130 ug/kg | BDL | 130 ug/kg | BDL | 140 ug/kg | BDL | 140 ug/kg |
| 717 | P | HEPTACHLOR EPOXIDE | BDL | 9 ug/kg | BDL | 9.1 ug/kg | BDL | 35 ug/kg | BDL | 130 ug/kg | BDL | 130 ug/kg | BDL | 140 ug/kg | BDL | 140 ug/kg |
| 718 | P | PCB-1242 | BDL | 90 ug/kg | BDL | 91 ug/kg | BDL | 350 ug/kg | BDL | 1300 ug/kg | BDL | 1300 ug/kg | BDL | 1400 ug/kg | BDL | 1400 ug/kg |
| 719 | P | PCB-1254 | BDL | 180 ug/kg | BDL | 180 ug/kg | BDL | 710 ug/kg | BDL | 2700 ug/kg | BDL | 2700 ug/kg | BDL | 2800 ug/kg | BDL | 2800 ug/kg |
| 720 | P | PCB-1221 | BDL | 90 ug/kg | BDL | 91 ug/kg | BDL | 350 ug/kg | BDL | 1300 ug/kg | BDL | 1300 ug/kg | BDL | 1400 ug/kg | BDL | 1400 ug/kg |
| 721 | P | PCB-1232 | BDL | 90 ug/kg | BDL | 91 ug/kg | BDL | 350 ug/kg | BDL | 1300 ug/kg | BDL | 1300 ug/kg | BDL | 1400 ug/kg | BDL | 1400 ug/kg |
| 722 | P | PCB-1248 | BDL | 90 ug/kg | BDL | 91 ug/kg | BDL | 350 ug/kg | BDL | 1300 ug/kg | BDL | 1300 ug/kg | BDL | 1400 ug/kg | BDL | 1400 ug/kg |
| 723 | P | PCB-1260 | BDL | 180 ug/kg | BDL | 180 ug/kg | 1600 | ug/kg | BDL | 2700 ug/kg | BDL | 2700 ug/kg | BDL | 2800 ug/kg | BDL | 2800 ug/kg |
| 724 | P | PCB-1016 | BDL | 90 ug/kg | BDL | 91 ug/kg | BDL | 350 ug/kg | BDL | 1300 ug/kg | BDL | 1300 ug/kg | BDL | 1400 ug/kg | BDL | 1400 ug/kg |
| 725 | P | TOXAPHENE | BDL | 180 ug/kg | BDL | 180 ug/kg | BDL | 710 ug/kg | BDL | 2700 ug/kg | BDL | 2700 ug/kg | BDL | 2800 ug/kg | BDL | 2800 ug/kg |
| 726 | P | P,P'-METHOXYCHLOR | BDL | 90 ug/kg | BDL | 91 ug/kg | BDL | 350 ug/kg | BDL | 1300 ug/kg | BDL | 1300 ug/kg | BDL | 1400 ug/kg | BDL | 1400 ug/kg |
| 739 | P | ENDRIN KETONE | BDL | 18 ug/kg | BDL | 18 ug/kg | BDL | 710 ug/kg | BDL | 270 ug/kg | BDL | 2700 ug/kg | BDL | 2800 ug/kg | BDL | 2800 ug/kg |
| | | OIL & GREASE LAB ID # | 141508 | | 142930 | | 142931 | | 142932 | | 142937 | | 142941 | | 142942 | |
| 1033 | C | OIL AND GREASE | 3800 | mg/kg | 2300 | mg/kg | 8200 | mg/kg | 26000 | mg/kg | 24000 | mg/kg | 50000 | mg/kg | 34000 | mg/kg |
| | | | 141516 | | 142905 | | 142906 | | 142907 | | 142908 | | 142909 | | 142910 | |
| 1080 | C | PERCENT SOLIDS | 88 | | 87 | | 91 | | 89 | | 91 | | 87 | | 84 | |
| | | | 141516 | | 142905 | | 142906 | | 142907 | | 142908 | | 142909 | | 142910 | |
| 1001 | C | CYANIDE | BDL | 0.57 MG/KG | BDL | 0.57 MG/KG | BDL | 0.55 MG/KG | BDL | 0.56 MG/KG | BDL | 0.55 MG/KG | BDL | 0.57 MG/KG | BDL | 0.6 MG/KG |

Table 5-4 (Cont'd)
Soil Pesticide/PCB and Oil and Grease and Cyanide Results

| CMPD CL | CMPD-DESC | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SITE | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | |
| | POINT | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | | SOIL | |
| | SAMPLE | S-5 1' | | S-6 1' | | S-7 1' | | S-7 2' | | S-7 3' | | S-8 17' | | S-8 2' | |
| | DATE | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | | 07/23/87 | |
| | DEPTH | 1' | | 1' | | 1' | | 2' | | 3' | | 17' | | 2' | |
| | MATRIX | SO | | SO | | SO | | SO | | SO | | SO | | SO | |
| | PESTICIDE/ PCB'S LAB I.D. # | 142881 | | 142882 | | 142883 | | 142884 | | 142885 | | 142886 | | 142887 | |
| 701 P | ALDRIN | BDL | 870 ug/kg | BDL | 150 ug/kg | BDL | 35 ug/kg | BDL | 36 ug/kg | BDL | 18 ug/kg | BDL | 94 ug/kg | BDL | 94 ug/kg |
| 707 P | ALPHA-BHC | BDL | 870 ug/kg | BDL | 150 ug/kg | BDL | 35 ug/kg | BDL | 36 ug/kg | BDL | 18 ug/kg | BDL | 94 ug/kg | BDL | 94 ug/kg |
| 703 P | BETA-BHC | BDL | 870 ug/kg | BDL | 150 ug/kg | BDL | 35 ug/kg | BDL | 36 ug/kg | BDL | 18 ug/kg | BDL | 94 ug/kg | BDL | 94 ug/kg |
| 704 P | GAMMA-BHC | BDL | 870 ug/kg | BDL | 150 ug/kg | BDL | 35 ug/kg | BDL | 36 ug/kg | BDL | 18 ug/kg | BDL | 94 ug/kg | BDL | 94 ug/kg |
| 705 P | DELTA-BHC | BDL | 870 ug/kg | BDL | 150 ug/kg | BDL | 35 ug/kg | BDL | 36 ug/kg | BDL | 18 ug/kg | BDL | 94 ug/kg | BDL | 94 ug/kg |
| 706 P | CHLORDANE | BDL | 8700 ug/kg | BDL | 1500 ug/kg | BDL | 350 ug/kg | BDL | 360 ug/kg | BDL | 180 ug/kg | 1000 | ug/kg | 1200 | ug/kg |
| 707 P | 4,4'-DDT | BDL | 1700 ug/kg | BDL | 290 ug/kg | BDL | 71 ug/kg | BDL | 73 ug/kg | BDL | 37 ug/kg | BDL | 190 ug/kg | BDL | 190 ug/kg |
| 708 P | 4,4'-DDE | BDL | 1700 ug/kg | BDL | 290 ug/kg | BDL | 71 ug/kg | BDL | 73 ug/kg | BDL | 37 ug/kg | BDL | 190 ug/kg | BDL | 190 ug/kg |
| 709 P | 4,4'-DDD | BDL | 1700 ug/kg | BDL | 290 ug/kg | BDL | 71 ug/kg | BDL | 73 ug/kg | BDL | 37 ug/kg | BDL | 190 ug/kg | BDL | 190 ug/kg |
| 710 P | DIELDRIN | BDL | 1700 ug/kg | BDL | 290 ug/kg | BDL | 71 ug/kg | BDL | 73 ug/kg | BDL | 37 ug/kg | BDL | 190 ug/kg | BDL | 190 ug/kg |
| 711 P | ALPHA-ENDOSULFAN | BDL | 870 ug/kg | BDL | 150 ug/kg | BDL | 35 ug/kg | BDL | 36 ug/kg | BDL | 18 ug/kg | BDL | 94 ug/kg | BDL | 94 ug/kg |
| 712 P | BETA-ENDOSULFAN | BDL | 1700 ug/kg | BDL | 290 ug/kg | BDL | 71 ug/kg | BDL | 73 ug/kg | BDL | 180 ug/kg | BDL | 190 ug/kg | BDL | 190 ug/kg |
| 713 P | ENDOSULFAN SULFATE | BDL | 1700 ug/kg | BDL | 290 ug/kg | BDL | 71 ug/kg | BDL | 73 ug/kg | BDL | 180 ug/kg | BDL | 190 ug/kg | BDL | 190 ug/kg |
| 714 P | ENDRIN | BDL | 1700 ug/kg | BDL | 290 ug/kg | BDL | 71 ug/kg | BDL | 73 ug/kg | BDL | 180 ug/kg | BDL | 190 ug/kg | BDL | 190 ug/kg |
| 715 P | ENDRIN ALDEHYDE | BDL | 17000 ug/kg | BDL | 2900 ug/kg | NA | | NA | | NA | | NA | | NA | |
| 716 P | HEPTACHLOR | BDL | 870 ug/kg | BDL | 290 ug/kg | BDL | 35 ug/kg | BDL | 36 ug/kg | BDL | 18 ug/kg | BDL | 94 ug/kg | BDL | 94 ug/kg |
| 717 P | HEPTACHLOR EPOXIDE | BDL | 870 ug/kg | BDL | 290 ug/kg | BDL | 35 ug/kg | BDL | 36 ug/kg | BDL | 18 ug/kg | BDL | 94 ug/kg | BDL | 94 ug/kg |
| 718 P | PCB-1242 | BDL | 8700 ug/kg | BDL | 1500 ug/kg | BDL | 350 ug/kg | BDL | 360 ug/kg | BDL | 180 ug/kg | BDL | 940 ug/kg | BDL | 940 ug/kg |
| 719 P | PCB-1254 | BDL | 17000 ug/kg | BDL | 2900 ug/kg | BDL | 710 ug/kg | BDL | 730 ug/kg | BDL | 370 ug/kg | BDL | 1900 ug/kg | BDL | 1900 ug/kg |
| 720 P | PCB-1221 | BDL | 8700 ug/kg | BDL | 1500 ug/kg | BDL | 350 ug/kg | BDL | 360 ug/kg | BDL | 180 ug/kg | BDL | 940 ug/kg | BDL | 940 ug/kg |
| 721 P | PCB-1232 | BDL | 8700 ug/kg | BDL | 1500 ug/kg | BDL | 350 ug/kg | BDL | 360 ug/kg | BDL | 180 ug/kg | BDL | 940 ug/kg | BDL | 940 ug/kg |
| 722 P | PCB-1248 | BDL | 8700 ug/kg | BDL | 1500 ug/kg | BDL | 350 ug/kg | BDL | 360 ug/kg | BDL | 180 ug/kg | BDL | 940 ug/kg | BDL | 940 ug/kg |
| 723 P | PCB-1260 | BDL | 17000 ug/kg | BDL | 2900 ug/kg | BDL | 710 ug/kg | BDL | 730 ug/kg | BDL | 370 ug/kg | BDL | 1900 ug/kg | BDL | 1900 ug/kg |
| 724 P | PCB-1016 | BDL | 8700 ug/kg | BDL | 1500 ug/kg | BDL | 350 ug/kg | BDL | 360 ug/kg | BDL | 180 ug/kg | BDL | 940 ug/kg | BDL | 940 ug/kg |
| 725 P | TOXAPHENE | BDL | 17000 ug/kg | BDL | 2900 ug/kg | BDL | 710 ug/kg | BDL | 730 ug/kg | BDL | 370 ug/kg | BDL | 1900 ug/kg | BDL | 1900 ug/kg |
| 726 P | P,P'-METHOXYCHLOR | BDL | 8700 ug/kg | BDL | 1500 ug/kg | BDL | 350 ug/kg | BDL | 360 ug/kg | BDL | 180 ug/kg | BDL | 940 ug/kg | BDL | 940 ug/kg |
| 739 P | ENDRIN KETONE | BDL | 17000 ug/kg | BDL | 290 ug/kg | BDL | 71 ug/kg | BDL | 73 ug/kg | BDL | 37 ug/kg | BDL | 190 ug/kg | BDL | 190 ug/kg |
| | OIL & GREASE LAB ID # | 142944 | | 142946 | | 142947 | | 142948 | | 142949 | | 142951 | | 142952 | |
| 1033 C | OIL AND GREASE | 560000 | mg/kg | 3700 | mg/kg | 11000 | mg/kg | 3800 | mg/kg | 980 | mg/kg | 20000 | mg/kg | 8900 | mg/kg |
| | | 142911 | | 142912 | | 142913 | | 142914 | | 142915 | | 142916 | | 142917 | |
| 1080 C | PERCENT SOLIDS | 55 | | 84 | | 85 | | 86 | | 85 | | 87 | | 86 | |
| | | 142911 | | 142912 | | 142913 | | 142914 | | 142915 | | 142916 | | 142917 | |
| 1001 C | CYANIDE | BDL | 0.9 MG/KG | BDL | 0.59 MG/KG | BDL | 0.59 MG/KG | BDL | 0.58 MG/KG | BDL | 0.59 MG/KG | BDL | 0.57 MG/KG | BDL | 0.58 MG/KG |

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Table 5-4 (Cont'd)

Soil Pesticide/PCB and Oil and Grease and Cyanide Results

| CMPD | CL | CMPD-DESC | | |
|---|---|---|---|---|
| | | SITE | 84021 | |
| | | POINT | SOIL | |
| | | SAMPLE | S-8 2'DUP | |
| | | DATE | 07/23/87 | |
| | | DEPTH | 2' | |
| | | MATRIX | SO | |
| | | PESTICIDE/ PCB'S LAB I.D. # | 142888 | |
| 701 | P | ALDRIN | BDL | 93 ug/kg |
| 702 | P | ALPHA-BHC | BDL | 93 ug/kg |
| 703 | P | BETA-BHC | BDL | 93 ug/kg |
| 704 | P | GAMMA-BHC | BDL | 93 ug/kg |
| 705 | P | DELTA-BHC | BDL | 93 ug/kg |
| 706 | P | CHLORDANE | 1300 | ug/kg |
| 707 | P | 4,4'-DDT | BDL | 180 ug/kg |
| 708 | P | 4,4'-DDE | BDL | 180 ug/kg |
| 709 | P | 4,4'-DDD | BDL | 180 ug/kg |
| 710 | P | DIELDRIN | BDL | 180 ug/kg |
| 711 | P | ALPHA-ENDOSULFAN | BDL | 93 ug/kg |
| 712 | P | BETA-ENDOSULFAN | BDL | 180 ug/kg |
| 713 | P | ENDOSULFAN SULFATE | BDL | 180 ug/kg |
| 714 | P | ENDRIN | BDL | 180 ug/kg |
| 715 | P | ENDRIN ALDEHYDE | NA | |
| 716 | P | HEPTACHLOR | BDL | 93 ug/kg |
| 717 | P | HEPTACHLOR EPOXIDE | BDL | 93 ug/kg |
| 718 | P | PCB-1242 | BDL | 930 ug/kg |
| 719 | P | PCB-1254 | BDL | 1800 ug/kg |
| 720 | P | PCB-1221 | BDL | 930 ug/kg |
| 721 | P | PCB-1232 | BDL | 930 ug/kg |
| 722 | P | PCB-1248 | BDL | 930 ug/kg |
| 723 | P | PCB-1260 | BDL | 1800 ug/kg |
| 724 | P | PCB-1016 | BDL | 930 ug/kg |
| 725 | P | TOXAPHENE | BDL | 1800 ug/kg |
| 726 | P | P,P'-METHOXYCHLOR | BDL | 930 ug/kg |
| 739 | P | ENDRIN KETONE | BDL | 180 ug/kg |
| | | OIL & GREASE LAB ID # | 142953 | |
| 1033 | C | OIL AND GREASE | 11000 | mg/kg |
| | | | 142918 | |
| 1080 | C | PERCENT SOLIDS | 84 | |
| | | | 142918 | |
| 1001 | C | CYANIDE | BDL | 0.59 MG/KG |

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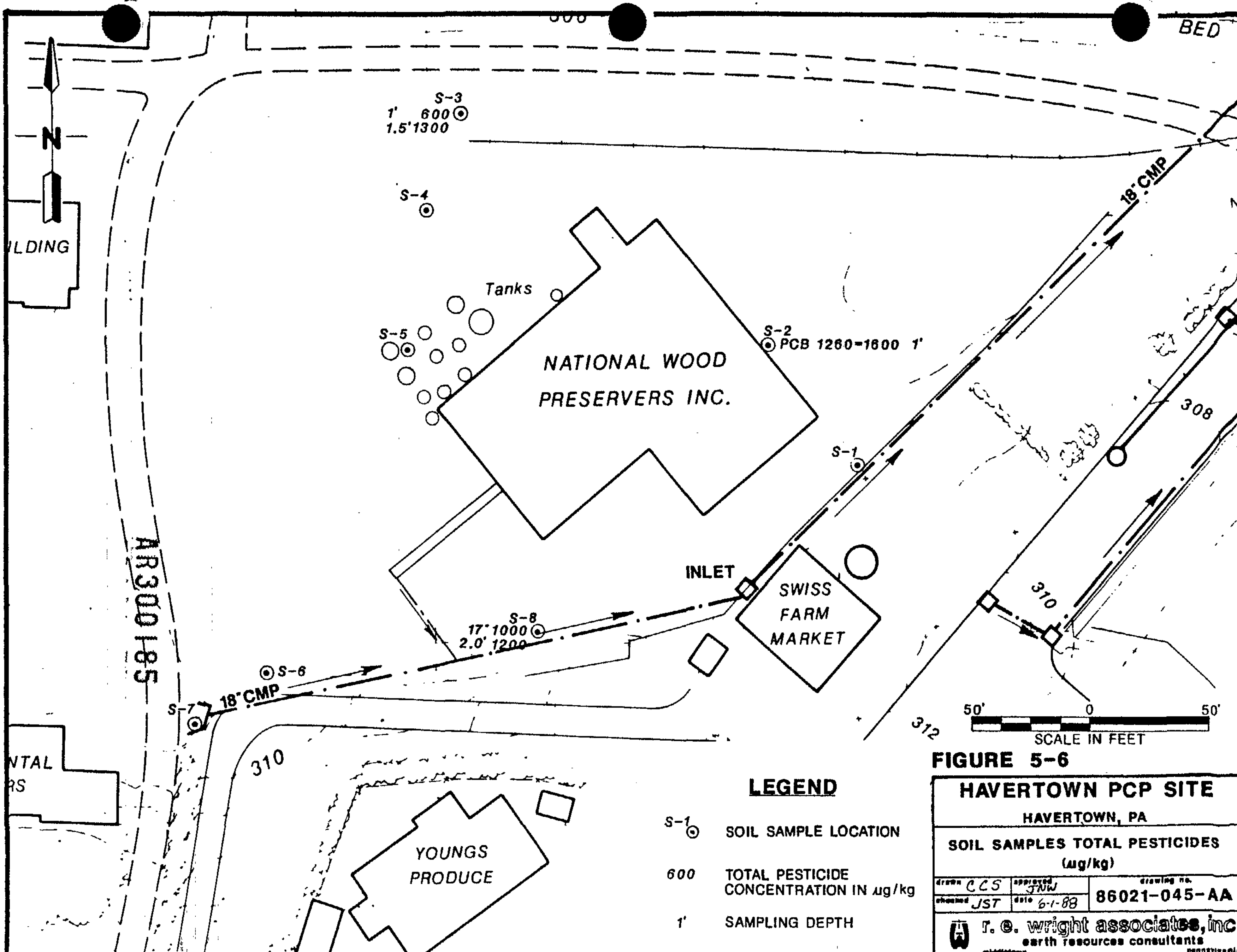
N
BED
S-3
1' 600
1.5' 1300
S-4
S-5
Tanks
S-2
PCB 1260=1600 1'
NATIONAL WOOD
PRESERVERS INC.
18" CMP
S-1
308
310
312
INLET
SWISS
FARM
MARKET
S-8
17' 1000
2.0' 1200
S-6
S-7
18" CMP
310
YOUNGS
PRODUCE
LDING
NTAL
RS
50' 0 50'
SCALE IN FEET
LEGEND
S-1 SOIL SAMPLE LOCATION
600 TOTAL PESTICIDE CONCENTRATION IN µg/kg
1' SAMPLING DEPTH
HAVERTOWN PCP SITE
HAVERTOWN, PA
SOIL SAMPLES TOTAL PESTICIDES
(µg/kg)
drawn CCS
approved JNW
checked JST
date 6-1-88
drawing no. 86021-045-AA
r. e. wright associates, inc.
earth resources consultants
middletown pennsylvania

FIGURE 5-6

concentrations of oil and grease were greater in samples collected near ground surface and decreased in samples collected at increasing depths. The results from the oil and grease analysis indicate that an oil product was introduced to the soils on NWP property. The approximate sample locations and oil and grease concentrations are shown in Figure 5-7. Due to the nature of the sampling and the small number of sampling locations, interpretations regarding zones of contaminant concentration could not be made with any reliability.

5.2.3.6 Dioxin and Dibenzofurans - Soil samples were collected at eight locations on the NWP property and analyzed for dioxin and chlorinated dibenzofuran isomers by California Analytical Lab, under the direction of EPA. Soil samples were to be collected at the surface, one foot, two feet, and three feet; however, due to the nature of the fill at NWP, it was not possible to collect soil samples at the desired depths at every soil sample location.

Tetra- through octa-isomers of dioxin and dibenzofuran were detected at various concentrations at each of the soil sample locations, with the results shown in Tables 5-5 and 5-6. Figure 5-8 shows soil sample locations and total concentrations of dioxin isomers, and Figure 5-9 shows the total concentration of dibenzofuran isomers. As shown by Figure 5-8, soil sample S-5 had the highest relative concentration of dioxin isomers, with 39,318 ppb detected at a depth of one foot. Soil sample S-5 was collected in the area of the storage tanks, where an oily fluid was readily obvious after penetrating the soil. The octa-dioxin isomer was detected in the highest concentration and made up the majority of the total dioxin concentration found at S-5, with a level of 30,579 ppb. By referring to Figure 5-9, it can be seen

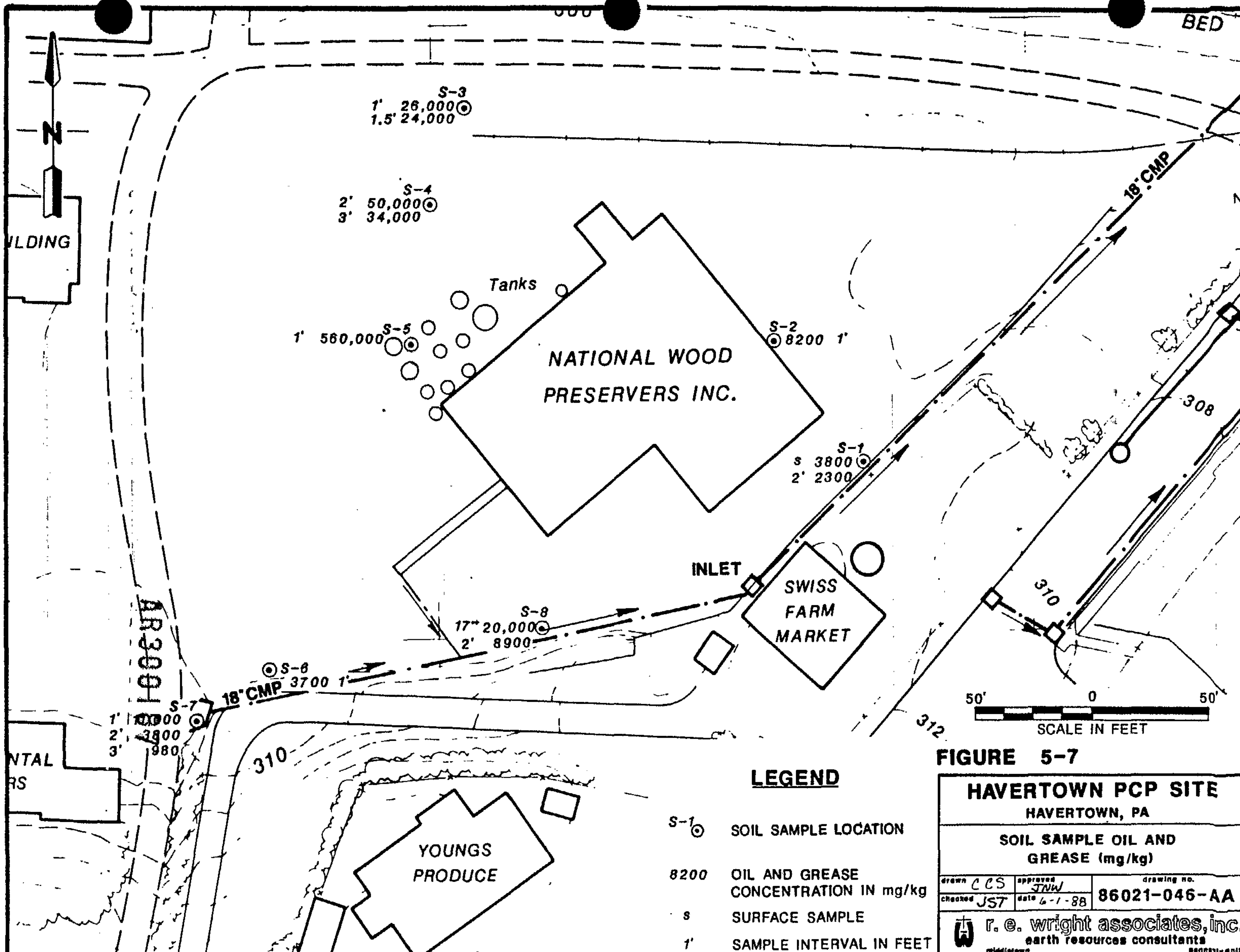


**FIGURE 5-7**

**HAVERTOWN PCP SITE**
HAVERTOWN, PA

SOIL SAMPLE OIL AND GREASE (mg/kg)

Table 5-5

Soil Dioxin Results

| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | |
|---|---|---|---|---|---|---|---|---|
| POINT: | S-1 | S-2 | S-3 | S-3 | S-4 | S-4 | S-5 | |
| LAB ID #: | 30892-19 | 30892-17 | 30892-18 | 30892-15 | 30892-25 | 30892-16 | 30892-24 | |
| GC/MS DATE: | 9-11-87 | 9-11-87 | 9-11-87 | 9-11-87 | 9-12-87 | 9-11-87 | 9-12-87 | |
| DEPTH: | (0') | (0') | (1') | (1.5') | (2') | (3') | (1') | |
| MATRIX: | SO | SO | SO | SO | SO | SO | SO | |
| CDP NAME | | | | | | | | |
| TCDD | 0.016 ppt | BDL 0.02 ppt | BDL 0.068 ppt | BDL 0.033 ppt | BDL 0.34 ppt | BDL 0.043 ppt | BDL 1.1 ppt | BDL |
| 2378 TCDD | 0.036 ppt | 0.077 ppt | BDL 0.071 ppt | BDL 0.11* ppt | BDL 0.3 ppt | BDL 0.034 ppt | BDL 0.45 ppt | 0.04 |
| PnCDD | 1.5 ppt | 1.2 ppt | 1.6 ppt | 1.4 ppt | 0.75 ppt | 1.4 ppt | BDL 2.1 ppt | 2.7 |
| 12378 PnCDD | 0.53 ppt | 0.54 ppt | 1.1 ppt | 0.7 ppt | 0.35 ppt | 0.61 ppt | BDL 1.8 ppt | BDL |
| HxCDD | 15.1 ppt | 24.2 ppt | 41.8 ppt | 35.4 ppt | 22.2 ppt | 25.3 ppt | 202 ppt | 35.3 |
| 123478 HxCDD | 1.4 ppt | 1.9 ppt | 3.8 ppt | 2.5 ppt | 1.5 ppt | 2.1 ppt | BDL 4.0 ppt | 3.5 |
| 123678 HxCDD | 3.7 ppt | 12.3 ppt | 22.9 ppt | 19.9 ppt | 109 ppt | 11.8 ppt | 140 ppt | 14.8 |
| 123789 HxCDD | 3 ppt | 4 ppt | 8.2 ppt | 5.8 ppt | 3.1 ppt | 4.5 ppt | 17.4 ppt | 7.5 |
| HpCDD | 68.9 ppt | 246 ppt | 331 ppt | 363 ppt | 199 ppt | 199 ppt | 3256 ppt | 283 |
| 1234678 HpCDD | 81.1 ppt | 379 ppt | 648 ppt | 613 ppt | 312 ppt | 339 ppt | 5124 ppt | 407 |
| OCDD | 392 ppt | 3237 ppt | 2784 ppt | 3420 ppt | 1653 ppt | 1490 ppt | 30579 ppt | 1871 |

(* MPC)

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Table 5-5 (Cont'd)

Soil Dioxin Results

| | | | | | |
|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | S-6 | S-7 | S-7 | S-7 | S-8 |
| LAB ID #: | 30892-22 | 30892-14 | 30892-21 | 30892-20 | 30892-23 |
| GC/MS DATE: | 9-12-87 | 9-11-87 | 9-12-87 | 9-12-87 | 9-12-87 |
| DEPTH: | (1') | (1') | (2') | (3') | (0') |
| MATRIX: | SO | SO | SO | SO | SO |
| CDP NAME | | | | | |
| TCDD | 0.063 ppt | BDL 0.022 ppt | BDL 0.068 ppt | BDL 0.029 ppt | BDL ? ppt |
| 2378 TCDD | ppt | BDL 0.013 ppt | BDL 0.026 ppt | BDL 0.024 ppt | 0.21 ppt |
| PnCDD | ppt | 0.20 ppt | 0.81 ppt | 0.06 ppt | 6.8 ppt |
| 12378 PnCDD | 1.1 ppt | 0.12 ppt | 0.49 ppt | 0.1 ppt | 5.1 ppt |
| HxCDD | ppt | 4.4 ppt | 48.7 ppt | 11.8 ppt | 106 ppt |
| 123478 HxCDD | ppt | 0.3 ppt | 2.3 ppt | 0.78 ppt | 11.8 ppt |
| 123678 HxCDD | ppt | 1.2 ppt | 29.9 ppt | 6.3 ppt | 29.6 ppt |
| 123789 HxCDD | ppt | 0.62 ppt | 5.2 ppt | 1.1 ppt | 29 ppt |
| HpCDD | ppt | 23 ppt | 462 ppt | 107 ppt | 470 ppt |
| 1234678 HpCDD | ppt | 30.9 ppt | 747 ppt | 162 ppt | 627 ppt |
| OCDD | ppt | 171 ppt | 2725 ppt | 685 ppt | 2090 ppt |

(* MPC)

Table 5-6
Soil Dibenzofuran Results

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | S-1 | S-2 | S-3 | S-3 | S-4 | S-4 | S-5 |
| LAB ID #: | 30892-19 | 30892-17 | 30892-18 | 30892-15 | 30892-25 | 30892-16 | 30892-24 |
| GC/MS DATE: | 9-11-87 | 9-11-87 | 9-11-87 | 9-11-87 | 9-12-87 | 9-11-87 | 9-12-87 |
| DEPTH: | (0') | (0') | (1') | (1.5') | (2') | (3') | (1') |
| MATIRX: | SO | SO | SO | SO | SO | SO | SO |
| CDF NAME | | | | | | | |
| TCDF | 0.32 ppt | 0.22 ppt | 0.51 ppt | 0.34 ppt | BDL 0.24 ppt | 0.28 ppt | BDL 1.3 ppt |
| 2378 TCDF | 0.019 ppt | 0.26 ppt | 0.04 ppt | 0.055 ppt | BDL 0.028 ppt | BDL 0.028 ppt | BDL 1.2 ppt |
| PnCDF | 5.2 ppt | 10.1 ppt | 5 ppt | 4.2 ppt | 3 ppt | 4.5 ppt | BDL ? ppt |
| 12378 PnCDF | 0.13 ppt | 1.5 ppt | 0.4 ppt | 0.31 ppt | 0.25 ppt | 0.36 * ppt | 2.1 ppt |
| 23478 PnCDF | 0.09 * ppt | 0.81 * ppt | 0.32 * ppt | 0.39 * ppt | BDL .12 * ppt | 0.24 * ppt | BDL 1.8 ppt |
| HxCDF | 39.8 ppt | 109 ppt | 119 ppt | 113 ppt | 73.4 ppt | 78.8 ppt | 544 ppt |
| 123478 HxCDF | 0.59 ** ppt | 5.5 ppt | 3 ** ppt | 1.9 ** ppt | 1.3 ** ppt | 1.6 ppt | 16.4 ppt |
| 123678 HxCDF | 0.75 ppt | 1.1 ppt | 1.5 ppt | 0.83 ppt | 0.63 ppt | 0.19 ppt | BDL 3.4 ppt |
| 123789 HxCDF | 0.13 ppt | 2.2 ppt | 0.56 ppt | 0.47 ppt | 0.32 ppt | 0.45 ppt | BDL 1.5 ppt |
| 234678 HxCDF | 0.85 ppt | 1.5 ppt | 1.1 ppt | 0.79 ppt | 0.6 ppt | 1.1 ppt | BDL 6.1 ppt |
| HpCDF | 51.1 ppt | 417 ppt | 745 ppt | 983 ppt | 348 ppt | 339 ppt | 4252 ppt |
| 1234678 HpCDF | 29.7 ppt | 98.2 ppt | 182 ppt | 186 ppt | 78 ppt | 87.3 ppt | 955 ppt |
| 1234789 HpCDF | 1.1 ppt | 5.8 ppt | 11 ppt | 10.9 ppt | 4.6 ppt | 6.3 ppt | 48.8 ppt |
| OCDF | 88.8 ppt | 1775 ppt | 3196 ppt | 4556 ppt | 749 ppt | 1000 ppt | 10706 ppt |

( * MPC )
(** POSSIBLE DPE INTERFERENCE)

AR300190

Table 5-6 (Cont'd)

Soil Dibenzofuran Results

| | | | | | |
|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | S-6 | S-7 | S-7 | S-7 | S-8 |
| LAB ID #: | 30892-22 | 30892-14 | 30892-21 | 30892-20 | 30892-23 |
| GC/MS DATE: | 9-12-87 | 9-11-87 | 9-12-87 | 9-12-87 | 9-12-87 |
| DEPTH: | (1') | (1') | (2') | (3') | (0') |
| MATIRX: | SO | SO | SO | SO | SO |
| COP NAME | | | | | |
| TCDF | 0.13 ppt | BDL 0.017 ppt | 0.20 ppt | 0.092 ppt | 0.56 ppt |
| 2378 TCDF | BDL .084* ppt | BDL .0096 ppt | BDL 0.033 ppt | BDL 0.016 ppt | 0.098 ppt |
| PnCDF | 4.5 ppt | 0.94 ppt | 2.6 ppt | 0.88 ppt | 23.5 ppt |
| 12378 PnCDF | 0.41 ppt | BDL 0.021 ppt | 0.079 ppt | BDL 0.025 ppt | 0.8 ppt |
| 23478 PnCDF | 0.18 * ppt | BDL 0.026 ppt | BDL *0.16 ppt | BDL 0.077 ppt | 0.61 * ppt |
| HxCDF | 89.3 ppt | 10.4 ppt | 241 ppt | 67 ppt | 227 ppt |
| 123478 HxCDF | 1.8 ppt | 0.17 ppt | 3.5 ppt | 0.61 ppt | 4.1 ppt |
| 123678 HxCDF | 0.84 ppt | 0.14 ppt | BDL 0.082 ppt | BDL 0.17 ppt | 6 ppt |
| 123789 HxCDF | 0.4 ppt | 0.021 ppt | 0.38 ppt | 0.089 ppt | 0.55 ppt |
| 234678 HxCDF | 0.95 ppt | 0.15 ppt | 1.2 ppt | BDL 0.25 ppt | 5.5 ppt |
| HpCDF | 409 ppt | 32.2 ppt | 1376 ppt | 340 ppt | 364 ppt |
| 1234678 HpCDF | 106 ppt | 10.1 ppt | 271 ppt | 63.6 ppt | 246 ppt |
| 1234789 HpCDF | 5.1 ppt | 0.37 ppt | 12 ppt | 2.8 ppt | 8.7 ppt |
| OCDF | 1067 ppt | 60.1 ppt | 2324 ppt | 470 ppt | 668 ppt |

( * MPC )
(** POSSIBLE DPE INTERFERENCE)

AR300191

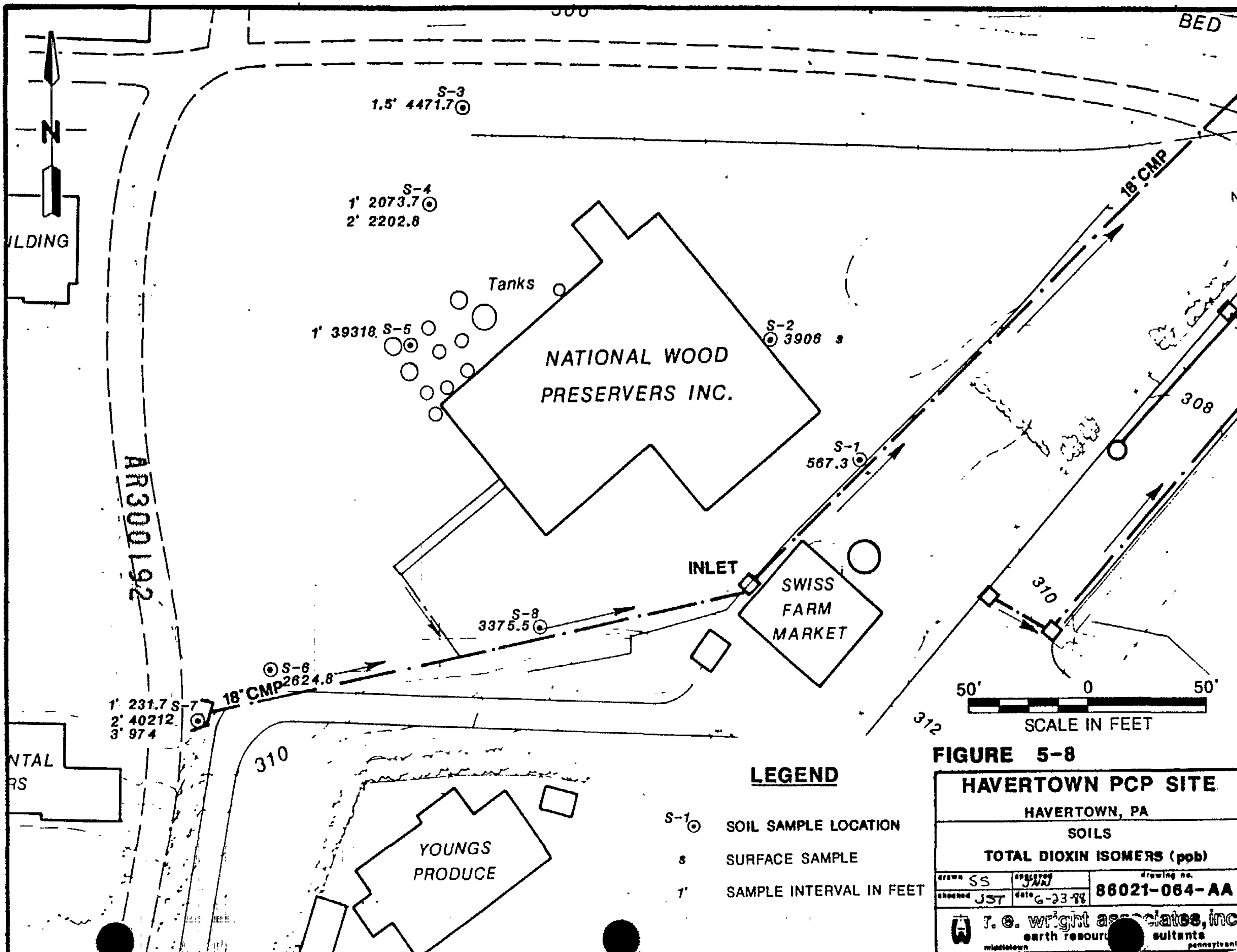


FIGURE 5-8

HAVERTOWN PCP SITE

HAVERTOWN, PA

SOILS

TOTAL DIOXIN ISOMERS (ppb)

drawn SS | approved JNAJ | drawing no. 86021-064-AA
checked JST | date 6-23-88

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middletown pennsylvania

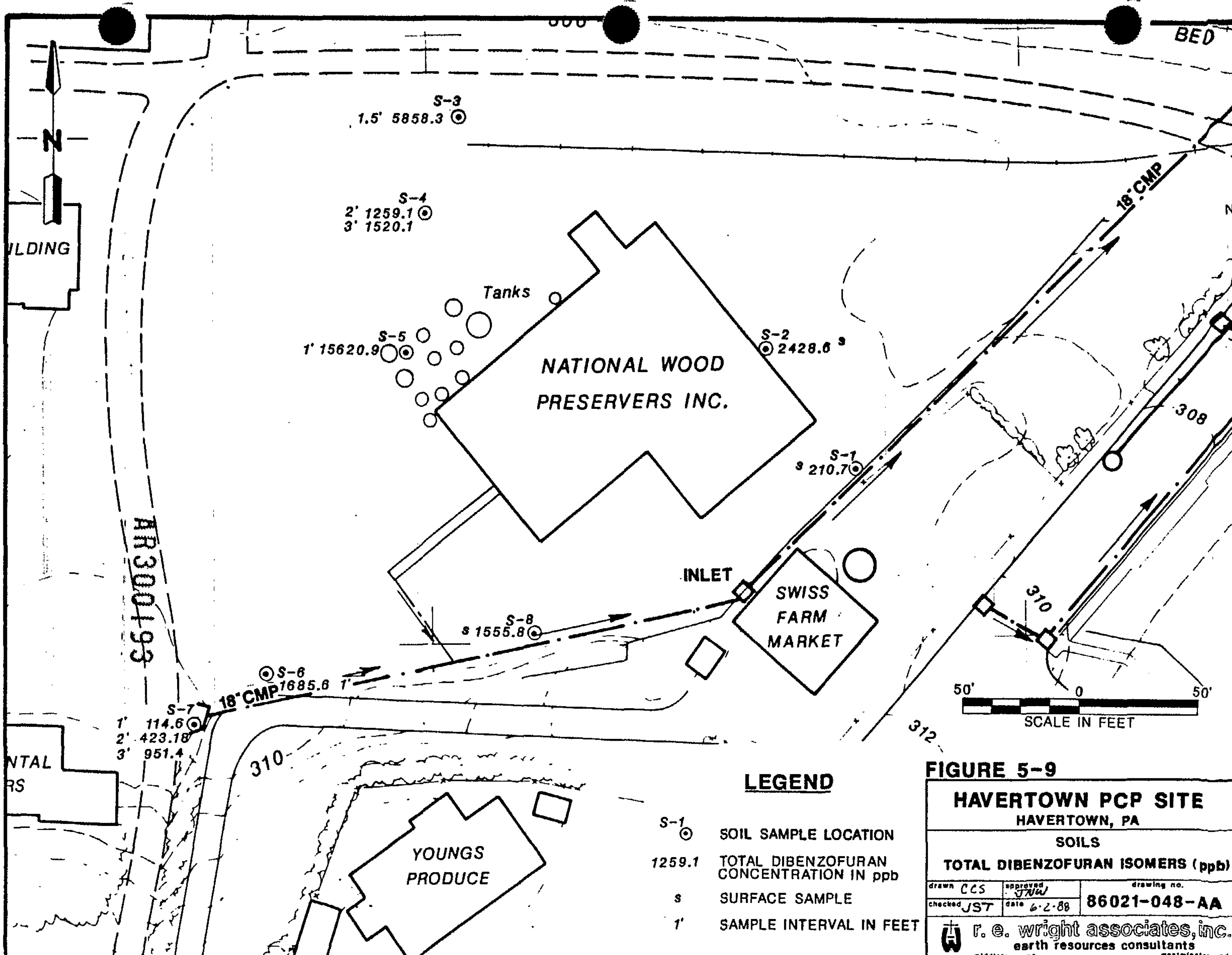


FIGURE 5-9

HAVERTOWN PCP SITE
HAVERTOWN, PA

SOILS

TOTAL DIBENZOFURAN ISOMERS (ppb)

| | | |
|---|---|---|
| drawn CCS | approved JNW | drawing no. |
| checked JST | date 6-2-88 | 86021-048-AA |

r. e. wright associates, inc.
earth resources consultants
middletown, pa. westminster, md.

that soil sample S-5 also contained the greatest concentration of dibenzofuran isomers, with the octa-isomer comprising a large portion of the total concentration of 15,620.9 ppb.

Previous dioxin investigations conducted at other sites (such as Rappe et al, 1987) reported identifying a portion of dioxin/ dibenzofuran isomer concentrations in relationship with depth. If these two variables were to be graphically illustrated, a bell-shaped curve would result indicating lower concentrations immediately above and below the higher concentrations of dioxin contamination in the soil column. Due to the sampling program, soil samples were not able to be collected as a complete series of samples from each location. Therefore, the data obtained from this sampling cannot confirm or refute this postulation.

### 5.2.4 Soil Sampling Results

Chemical results from the soils investigation conducted at NWP indicate that elevated levels of metals of concern such as arsenic, cadmium, chromium, copper, lead, mercury, and zinc are present in the first 0 to 4 feet of soil. The presence of these metals may be the result of present NWP operations involving the current wood-treating solutions. No information on the use or presence of heavy metals in past wood-treating operations is known.

Volatile organic chemical analysis was performed on the soil samples, revealing elevated levels of total xylenes and methylene chloride and acetone. Lesser amounts of benzene and trichloroethene were also found.

Base neutral and acid extractable compounds such as PCP, 2-methylnaphthalene, naphthalene, phenanthrene and fluorene were found most frequently and in the highest concentrations. Soil sampling location S-5 (tank area) had the greatest concentration of BNAs. Other soil sampling locations contained elevated concentrations of BNAs, although not as high as at S-5, and are significant and reflect the widespread contamination of soil on the NWP property.

Pesticide and PCB analysis indicated that beta-BHC and chlordane were detected in only four of the soil samples. PCB (1260) was found in only one soil sample, S-2 (one foot), at a concentration of 1600 ug/kg.

Cyanide and oil & grease analysis revealed that no cyanide was found above detection limits in the soil and that oil & grease levels were significantly elevated throughout the soil samples taken. This again indicates the widespread introduction of an oil product to the soils at NWP.

Soil samples were also analyzed for dioxin and chlorinated dibenzofuran isomers. Soil sample S-5 (tank area) had the highest total dioxin isomer concentration, 39,318 ppb. The octa-dioxin isomer made up the majority of the total dioxin isomer concentration at S-5 and the other soil samples taken. The same pattern was true for the chlorinated dibenzofurans as well.

In summary, the soil sampling at the NWP plant site revealed that the soils contain significant concentrations of fuel oil and wood preservative (PCP) components which are widely distributed across the site. Concentrations of metals, possibly the present NWP operations, dioxin/dibenzofuran, and one location containing PCB (1260) were also identified in the soils. Due to the small sampling base, in which only eight locations were sampled, the extent of contaminant distribution both horizontally and vertically, as well as the maximum contaminant concentration range in the soils, is not clearly defined.

## 5.3 Groundwater Investigation

### 5.3.1 Purpose for Groundwater Investigation

The groundwater investigation was undertaken to provide site-specific hydrogeologic information on the characteristics of the unconsolidated deposits, weathered and fresh bedrock, and groundwater conditions at the site.

The groundwater investigation began with a preliminary sampling of 10 existing monitoring wells to determine appropriate locations for the installation of six cluster well stations. Each cluster well station consists of a shallow well screened to monitor the water table surface, an intermediate well screened in the saprolite near the top of bedrock, and a deep well screened in the bedrock. This monitoring well network provided the following:

- Description of the depths, thicknesses, and types of unconsolidated materials.

- Determination of the thickness of saturated materials.

- Testing of the saturated aquifer to determine its hydraulic characteristics.

- Assessment of the potentiometric head differential between the unconsolidated and bedrock materials.

- Determination of the levels of dissolved contaminants within the network area.

- Determination of the apparent location of the subsurface oil plume, and the associated dissolved contamination plume.

Subcontracted drilling was conducted by Empire Soils Investigations, Inc. (Empire) under the supervision of REWAI. All work associated with the installation of wells, well development, collection of water quality samples, and hydraulic testing was completed as specified by the approved SOP.

### 5.3.2 Groundwater Monitoring System Procedures

Geologists and staff scientists from REWAI and drilling crews from Empire were on-site from January 18, 1988, to February 26, 1988, to conduct work associated with the installation of the cluster well network at the Havertown PCP site in Havertown, Pennsylvania. A total of 18 groundwater monitoring wells were installed at the site in 6 locations, as shown on Plate 1.

5.3.2.1 Monitoring Well Construction - The hydrogeologic investigation required the drilling of 18 wells. The wells consisted of 6 deep exploratory wells and 12 shallower monitoring wells. The wells were installed such that two wells, one shallow

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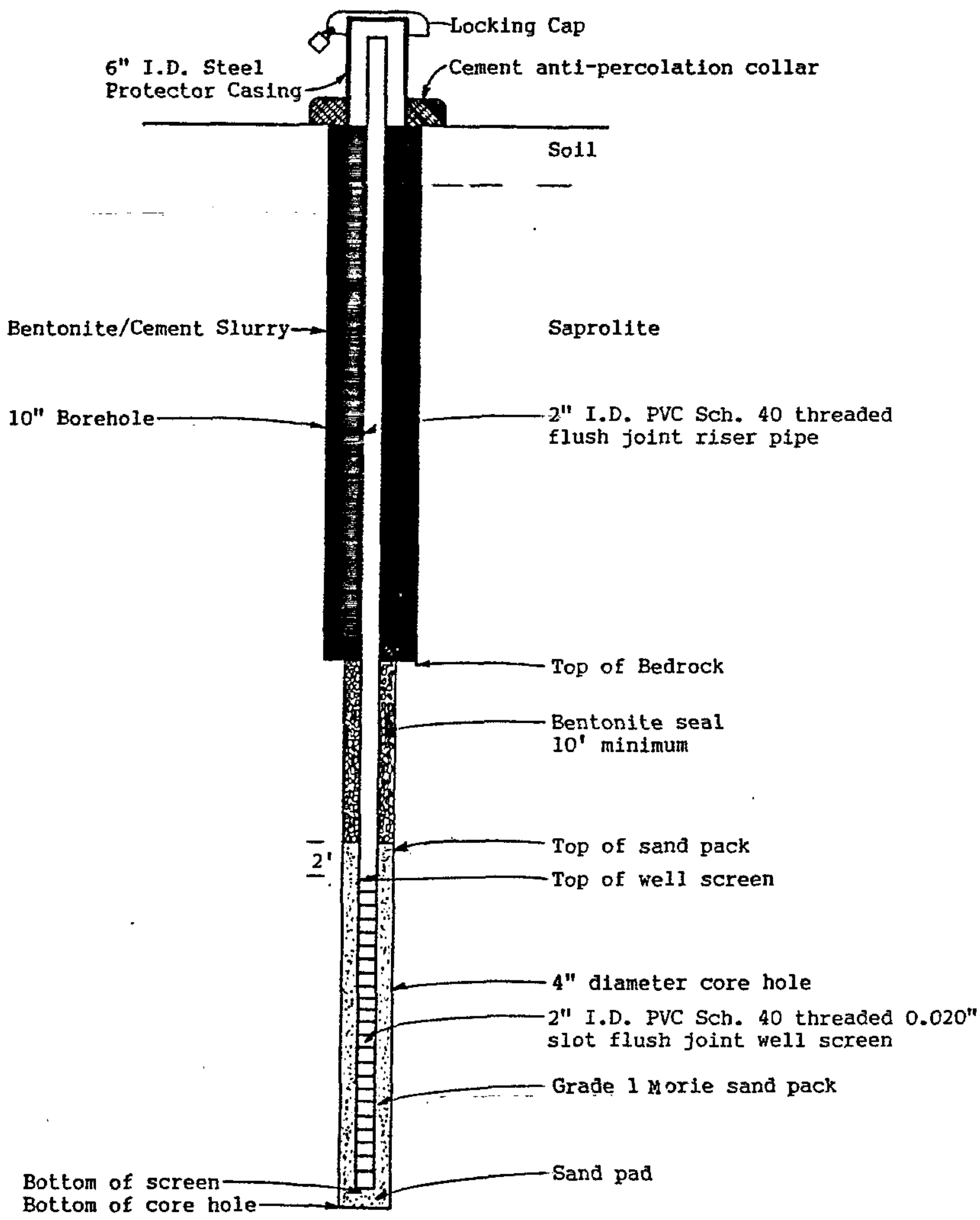
and one intermediate depth, were drilled adjacent to each deep exploratory well, thus providing a nest of three wells at each of the six locations. The deep exploratory wells were used to ascertain the water quality in the bedrock aquifer and to provide information on the geology of the site as it relates to the nature of contaminant migration. The intermediate wells were used to obtain information on the water quality at the bedrock/saprolite interface, while the shallow wells provided data about the surface of the water table, which was thought to contain a floating oil lens. All wells have been used together to assess the horizontal and vertical migration potential for the contaminants.

5.3.2.1.1 Deep Exploratory Wells - The exact locations of the six exploratory wells were determined following a site survey, mapping, and a preliminary sampling of selected existing wells. Prior to drilling, DER approved the cluster well locations. The deep exploratory wells served as bedrock wells for the subsequent well nests. The DER-approved criteria for deep monitoring well construction (Figure 5-10) are presented in summary below.

Deep well construction steps can be summarized as follows:

- Using six-inch ID hollow-stem augers, drilling was advanced through the unconsolidated overburden section until bedrock was encountered, obtaining continuous split-spoon samples throughout this interval. Soil samples collected from the split spoons were collected in standard soil jars, labeled, and placed in the heated on-site storage trailer. Subsequent to the samples attaining room temperature, each jar was opened and a




Vertical Scale 1 inch = 10 feet

**FIGURE 5-10**
## HAVERTOWN PCP SITE
### DEEP WELL CONSTRUCTION

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heated headspace analysis performed with a field organic vapor analyzer (OVA) and the results recorded. The overburden/bedrock interface was identified as the depth at which the split-spoon sampler did not progress at least 6 inches as a result of 100 blows and followed by refusal of the augers to advance. The resulting borehole had an approximate diameter of 10 inches.

- The REWAI site geologists prepared a written description and classification of the soil samples using the Unified Soil Classification System (USCS). Soil samples were placed into standard glass soil jars, appropriately labeled, and boxed for storage at the Command Post.

- Upon refusal, the augers were raised approximately two feet above the overburden/bedrock interface, followed by the installation of at least a two-foot thick bentonite pellet seal below the bottom of the augers. The bentonite pellets were given time to set and swell before continuing with the drilling. After swelling of the bentonite, the augers were pushed back down through the bentonite seal without rotation until once again encountering the top of bedrock. Although a plug was used to prevent the bentonite from entering the augers, some had inevitably forced its way into the hollow stem. Therefore, after the auger flight was seated into the bentonite seal, the plug was removed from the augers and the interior was cleaned of bentonite by using several Shelby tubes.

o Drilling proceeded using a four-inch core barrel. Cores were collected in five-foot sections and the lithologic description was recorded by REWAI geologists. Rock coring was completed to a depth of at least 20 to 30 feet below the overburden/bedrock interface. The deep exploratory wells did not exceed 70 feet below the ground surface. All rock cores collected were appropriately labeled and stored in wooden boxes at the Command Post. At the completion of the field investigation, the cores and soil samples were relinquished to DER's custody for long-term storage or disposal in accordance with the provisions of the "Contaminated Materials Handling Plan," Section 5.0, of the approved SOP.

o After coring a 10-foot interval in each of the 6 exploratory wells, constant-head packer tests were completed to measure the bedrock's approximate permeability in each cored interval. Some intervals were too fractured, resulting in substantial leakage around the packer seal, which precluded a proper test. Packer testing was continued in approximately 10-foot intervals until the final well depth was attained.

o Subsequent to completion of the packer tests, a 2-inch ID Schedule 40 threaded flush-joint PVC 0.020-inch slotted well screen was installed into the core hole, with the bottom of the well resting on the bottom of the core hole and with the top of the screen at least 10 feet below the overburden/bedrock interface. Two-inch ID Schedule 40 threaded flush-joint PVC riser pipe then extended from the top of the well screen up to at least one foot above the ground surface.

- A Grade 1 Morie sand pack was then placed from the bottom of the core hole up to at least one foot above the top of the well screen. The annular space between the core hole and the PVC riser pipe was then filled with a thick bentonite slurry from the overburden/ bedrock interface down to the top of the sand pack. At this point, the augers were slowly pulled out of the ground while a four percent bentonite/cement slurry was pumped, under pressure into the annulus, effectively sealing the annulus.

- The well was then fitted with a six-inch ID steel protector pipe extending from at least one foot above the ground surface downward to a depth of at least two feet below grade. If the well was located in a heavy traffic area, a locking, watertight driveover was installed in place of the steel protector pipe. A cement anti-percolation collar was installed around the protector pipes and an upper cement seal around the driveovers to preclude surface water infiltration and frost heave. A locking cap and #3303 Master lock was placed on each well, with a duplicate set of keys furnished to the DER site representative. All locks were keyed alike.

- Final well locations were visibly marked with fluorescent orange-colored paint and flagging on the NWP site. Wells on the PCG property were either installed as flush-mount driveovers or with protector pipe extending aboveground, which was painted a dark brown so as not to attract attention. Wells have been located by a registered Pennsylvania surveyor, under subcontract to REWAI, and tied into the project base map.

5.3.2.1.2 Shallow and Intermediate Wells - Twelve additional wells were constructed to complement the six deep exploratory wells. Two wells were constructed adjacent to each deep exploratory well, thus providing a nest of three wells at each cluster well station. Each shallow well was set to screen the surface of the water table to intercept any pentachlorophenol (PCP)/oil layer on top of the groundwater table. The intermediate depth well was screened in the saprolite layer or highly weathered bedrock zone near the saprolite/bedrock interface. Prior to the installation of the shallow and intermediate-depth wells, the DER site coordinator conferred with the REWAI geologist(s) and approved the location and construction of each well. The depths of these wells ranged between 15 1/2 and 55 1/2 feet below ground surface. The shallow and intermediate monitoring well construction specifications (Figure 5-11) are summarized as follows:

- o Using the deep exploratory well log as a guide, the screened intervals were determined for the shallow and intermediate depth wells based upon the objectives of the monitoring program described in Section 5.3.1. The shallow- and intermediate-depth wells were then installed in the proximity of the deep exploratory well.

- o Using six-inch ID hollow-stem augers, the borehole was drilled through the unconsolidated overburden section until the desired depth was reached. A plug was used

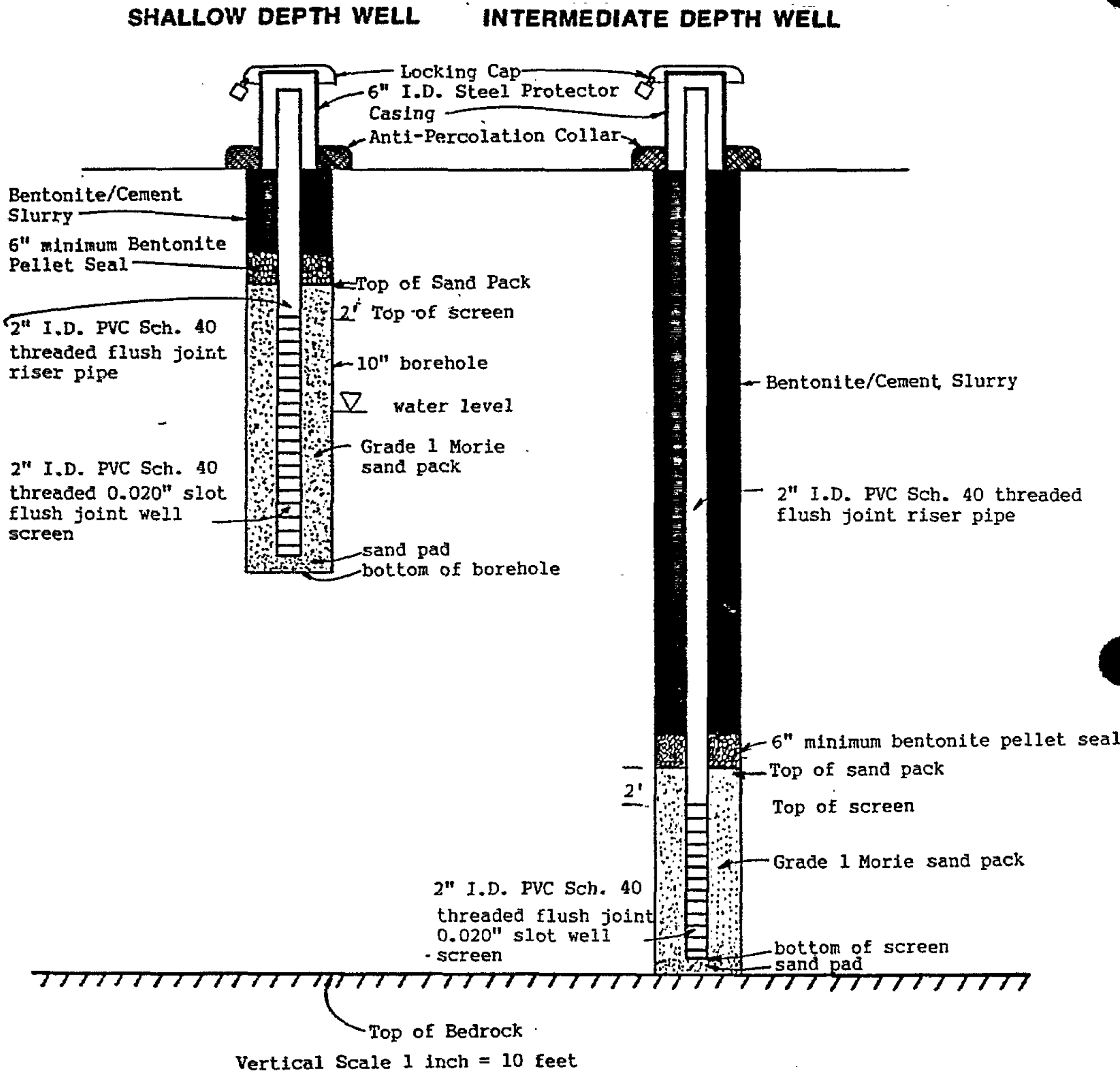


**FIGURE 5-11**

**HAVERTOWN PCP SITE**

**SHALLOW AND INTERMEDIATE DEPTH WELL CONSTRUCTION**

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inside of the augers reducing the need to clean out the inside of the augers upon reaching the desired well depth. No soil samples were obtained from either the shallow- or intermediate-depth wells as they were installed close to the deep wells where this information was already obtained. The resulting borehole had an approximate diameter of 10 inches.

- Two-inch Schedule 40 threaded flush-joint PVC riser pipe and 0.020-inch slotted well screen was then installed at the predetermined depth interval.

- The annulus between the borehole and the well screen was sand packed with Grade 1 Morie sand to a height of approximately two feet above the top of the well screen. This was accomplished by retracting the augers as the sand was poured into the augers. Continuous measurements by REWAI and Empire ensured the proper installation of the sand pack.

- A bentonite pellet seal at least six inches thick was placed immediately above the sand-packed intervals with clean water added, if necessary, to allow the pellets to swell and seal. Above this seal, the annular space was filled under pressure with a four percent bentonite/cement slurry to a depth of approximately two feet below ground surface. Both the bentonite pellet seal and the bentonite/cement slurry were installed as the augers were retracted, in a fashion similar to the sand pack installation. Continuous inspection during these procedures yielded a properly constructed well.

- A six-inch ID steel protective casing or driveover manhole cover was then placed into the borehole and a anti-percolation collar was installed in the remaining annulus up to surface, using Class B cement concrete. The collar was mounded at the surface approximately six inches for wells with stickup and two inches for driveovers, to promote drainage away from the casing. The outer edge of the cement collar for wells with stickup has vertical walls to preclude heaving from freezing and thawing.

- The six-inch ID steel protector casing on stickup wells and the two-inch PVC riser pipe on driveover wells were equipped with locking well caps. The inner two-inch diameter PVC casing was also equipped with a vent to allow proper pressure equalization during changes in water level. All locks were keyed alike using #3303 Master locks, with one set of keys presented to DER's site representative.

5.3.2.1.3 Well Construction Requirements and Decontamination - Care was taken to assure that plumbness and alignment of the wells were within the generally accepted tolerance for monitoring wells so as to allow the performance of all testing and sampling.

Groundwater effluent, derived from the well drilling, was diverted to steel 55-gallon drums near the well and transferred by suction pump to the on-site storage tank or stored on-site in the drum storage area as described in the "Contaminated Materials

Handling Plan" (Section 9.0) of the approved SOP. Coring water was recirculated to minimize the volume of drill water generated.

Upon mobilizing to a cluster well station, clean plastic sheeting was first laid down around the well site; on top of this, fresh plywood sheets were placed. The drilling rig was then backed onto the plywood. Additional plastic sheeting was then placed around portions of the drilling rig in an effort to reduce decontamination procedures. Drilling then proceeded through a hole in the plywood. The use of the plywood sheets and the underlying plastic sheeting minimized the potential for surface contamination at the drilling sites.

Prior to mobilization of the rig to another cluster well station, the just completed site was decontaminated by removing and drumming the plastic sheeting on it, after which the drill rig was moved to the decontamination area where it was thoroughly steamed cleaned with a steam/detergent mix, followed by a steam/high pressure hot water rinse. Drilling tools and miscellaneous equipment used in the construction of the well were decontaminated in a similar manner.

Specific sample collection implements such as split-spoons and augers were also subjected to the high-pressure steam/detergent wash, followed by a high-pressure steam/hot water rinse. Plastic sheeting and plywood boards used during drilling were either drummed or stored on-site in the drum storage area.

5.3.2.2 Supervision, Sample Collection, and Record Keeping - All drilling and well construction activities were supervised by REWAI's on-site project geologists in coordination with DER's project officer and REWAI's project director. Lithologic samples were collected continuously in the six deep exploratory wells using two-inch ID split-spoon samples for the unconsolidated deposits and a four-inch diameter by five-foot-long core barrel for sampling the bedrock. Unconsolidated samples were placed into clean glass soil jars; clearly labeled with the job number, well number, sample depth interval, date, and blow counts; and stored on-site for future reference. Core samples were placed into appropriate wooden core boxes, clearly labeled with the job number, well number, sample depth intervals, date, recovery, RQD, and stored on-site for future reference. All observations made by REWAI's project geologists are included on the lithologic and well construction logs in Appendix 1.

REWAI geologists coordinated the drilling and construction of each of the wells and have prepared well logs which accurately depict the history of well construction from split-spoon sampling through well completion. Each final well log contains at a minimum:

- Project name and REWAI job number, well number, location of well, total depth of well, time/date of starting, time/date of completion.

- Results of field FID or PID real-time air monitoring volatile organic (VOA) analyses.

- Visual classification of all continuous split-spoon samples using a Munsell Rock Color Chart, grain size indicator, and the Unified Soil Classification System.

- Visual classification of all cores recovered from the initial deep exploration well, including presence of fractured and/or weathered bedrock zones.

- Record of the number of blows necessary to drive the split-spoon sampler for each of four consecutive six-inch intervals, during continuous soil sampling.

- Depth of the top of firm or fresh rock and all other contacts between dissimilar materials and bottom of the hole.

- Depths at which water is encountered and the depth of water upon completion of the well.

All drilling operations were performed in accordance with the site-specific "Health and Safety Plan," Section 7.0, and the "Contaminated Materials Handling Plan," Section 9.0, of the approved SOP.

5.3.2.3 Ambient Temperature Headspace Analysis - The purpose of the ambient temperature headspace (ATH) was to allow for more accurate organic vapor readings in a controlled environment without disparities caused by temperature, moisture, wind, and drill rig exhaust in the field. The ATH was used in order to obtain a qualitative indication of volatiles in the soils at the site and to make general relationships from the ATH results and the water chemistry results. It should be noted that soil samples were not collected specifically for the purpose of conducting a headspace analysis and that the results are not exact because of the length of time between sample collection and measurement and further because the samples were not collected in septum-sealed jars.

Soil samples were logged and collected from the deep well of each newly installed monitoring well series. Soil samples were collected continuously at two-foot intervals down to bedrock by means of a two-inch split-spoon sampler. A clean split-spoon was used to sample each interval and a sample from each interval was collected in a clean 1,000 milliliter (ml) glass soil jar. The sample jars were partially filled leaving a headspace of approximately equal volume in each container. The sample jars were then placed in a heated storage trailer at a temperature of approximately 70$^{\circ}$F for a minimum of 24 hours. As the samples were warmed to room temperature, volatiles were released from the soil and collected in the headspace of each sample jar. All headspace measurements were made using a flame ionizing organic vapor analyzer (OVA) and are recorded in Table 5-7.

According to the table, well CW-1D at the NWP plant contained elevated soil gas levels just above the groundwater table, which was at 8.2 feet below the ground surface on March 17, 1988. A minor amount of soil gas was detected just above the saprolite/bedrock interface in the 26- to 28-foot sample intervals. Well CW-2D, also on the NWP plant, contained elevated soil gas levels throughout the unconsolidated units sampled, with slightly more elevated levels found above the water table.

On the PCG property, well CW-3D contained significantly elevated soil gas levels at the 12- to 14-foot and 16- to 20-foot sample intervals. These intervals correspond approximately with the groundwater table and the saprolite/bedrock interface respectively. Well CW-4D has moderately elevated soil gas levels

Table 5-7

Ambient Temperature Headspace Analysis Results

| Well | Sample Depth | Sample Date | Analysis Date | Total Volatile Organic Vapors (ppm) | USCS Symbol |
|---|---|---|---|---|---|
| CW-1D | 0- 2' | 2/3/88 | 2/4/88 | 28.0 | SP |
| | 2- 4' | 2/3/88 | 2/4/88 | 92.0 | SP |
| | 4- 6' | 2/3/88 | 2/4/88 | 100.0 | ML |
| | 6- 8' | 2/3/88 | 2/4/88 | 17.0 | SM |
| | 8-10' | 2/3/88 | 2/4/88 | 23.0 | SM |
| | 10-12' | 2/3/88 | 2/4/88 | 9.0 | ML |
| | 12-14' | 2/3/88 | 2/4/88 | 7.0 | SM |
| | 14-16' | 2/3/88 | 2/4/88 | 9.0 | CL |
| | 16-17'2" | 2/3/88 | 2/4/88 | 3.0 | SM |
| | 18-18'9" | 2/3/88 | 2/4/88 | 6.5 | SM |
| | 20-22' | 2/3/88 | 2/4/88 | 6.5 | SM |
| | 22-24' | 2/3/88 | 2/4/88 | 6.0 | SP |
| | 24-26' | 2/3/88 | 2/4/88 | 2.5 | SM |
| | 26-28' | 2/3/88 | 2/4/88 | 10.0 | SM |
| | 28-30' | 2/3/88 | 2/4/88 | 1.5 | SM |
| CW-2D | 0- 1' | 1/20/88 | 1/22/88 | 0.4 | SM |
| | 1- 2' | 1/20/88 | 1/22/88 | 32.0 | SM |
| | 2' | 1/20/88 | 1/22/88 | 0.2 | SM |
| | 2- 3' | 1/20/88 | 1/22/88 | 46.0 | SP |
| | 3- 4' | 1/20/88 | 1/22/88 | 24.0 | SM |
| | 4- 6' | 1/20/88 | 1/22/88 | 10.0 | SM |
| | 6- 8' | 1/20/88 | 1/22/88 | 6.4 | SM |
| | 8-10' | 1/20/88 | 1/22/88 | 51.0 | SM |
| | 10-12' | 1/20/88 | 1/22/88 | 21.0 | SM |
| | 12-14' | 1/20/88 | 1/22/88 | 25.5 | SP |
| | 14-15.9' | 1/20/88 | 1/22/88 | 24.0 | SP |
| | 16-17.5' | 1/20/88 | 1/22/88 | 4.2 | SP |
| | 18-20.0' | 1/21/88 | 1/22/88 | 6.0 | SM |
| | 20-22.0' | 1/21/88 | 1/22/88 | 10.0 | SM |
| | 22-23.75' | 1/21/88 | 1/22/88 | 11.0 | SM |
| | 24-24.9' | 1/21/88 | 1/22/88 | 12.0 | SM |
| | 26-28.0' | 1/21/88 | 1/22/88 | 26.0 | SM |
| | 28-29.5' | 1/21/88 | 1/22/88 | 22.4 | SM |
| | 30-31.0' | 1/21/88 | 1/22/88 | 10.0 | SM |
| | 32-32.33' | 1/21/88 | 1/22/88 | 5.2 | SM |

Table 5-7 (cont'd)

| Well | Sample Depth | Sample Date | Analysis Date | Total Volatile Organic Vapors (ppm) | USCS Symbol |
|---|---|---|---|---|---|
| CW-3D | 0- 2' | 2/9/88 | 2/19/88 | 6.0 | SM |
| | 2- 4' | 2/9/88 | 2/19/88 | 1.0 | SM |
| | 4- 6' | 2/9/88 | 2/19/88 | 1.6 | SM |
| | 6- 8' | 2/9/99 | 2/19/88 | 1.0 | SP |
| | 8-10' | 2/9/88 | 2/19/88 | -- | SP |
| | 10-12' | 2/9/88 | 2/19/88 | 1.6 | SP |
| | 12-14' | 2/9/88 | 2/19/88 | 140 | SP |
| | 14-16' | 2/9/88 | 2/19/88 | -- | SP |
| | 16-18' | 2/9/88 | 2/19/88 | 90 | SP |
| | 18-20' | 2/9/88 | 2/19/88 | 100 | SP |
| CW-4D | 0- 2' | 2/22/88 | 2/23/88 | -- | SP |
| | 2- 4' | 2/22/88 | 2/23/88 | 3.0 | SP |
| | 4- 6' | 2/22/88 | 2/23/88 | -- | SP |
| | 6- 8' | 2/22/88 | 2/23/88 | -- | SP |
| | 8-10' | 2/22/88 | 2/23/88 | -- | SP |
| | 10-12' | 2/22/88 | 2/23/88 | -- | SP |
| | 12-14' | 2/22/88 | 2/23/88 | -- | SP |
| | 14-16' | 2/22/88 | 2/23/88 | 2.0 | SP |
| | 16-18' | 2/22/88 | 2/23/88 | 10.0 | SP |
| | 18-20' | 2/22/88 | 2/23/88 | 5.5 | SP |
| | 20-22' | 2/22/88 | 2/23/88 | 60 | SP |
| | 22-24' | 2/22/88 | 2/23/88 | 75 | SP |
| | 24-26' | 2/22/88 | 2/23/88 | 9 | SP |
| | 26-28' | 2/22/88 | 2/23/88 | 20 | SP |
| CW-5D | 0- 2' | 2/15/88 | 2/19/88 | 1.0 | SP |
| | 2- 4' | 2/15/88 | 2/19/88 | -- | SP |
| | 4- 6' | 2/15/88 | 2/19/88 | -- | SP |
| | 6- 8' | 2/15/88 | 2/19/88 | -- | SP |
| | 8-10' | 2/15/88 | 2/19/88 | -- | SP |
| | 10-12' | 2/15/88 | 2/19/88 | 300 | SM |
| | 12-14' | 2/15/88 | 2/19/88 | >1000 | SM |
| | 14-16' | 2/15/88 | 2/19/88 | 150 | SM |
| | 16-18' | 2/15/88 | 2/19/88 | 25 | SM |
| | 18-20' | 2/15/88 | 2/19/88 | 30 | SM |
| CW-6D | 1- 3' | 2/17/88 | 2/19/88 | >1000 | SW |
| | 3- 5' | 2/17/88 | 2/19/88 | 120 | SW |
| | 5- 7' | 2/17/88 | 2/19/88 | 100 | SM |
| | 7- 9' | 2/17/88 | 2/19/88 | 400 | SM |
| | 9-11' | 2/17/88 | 2/19/88 | 300 | SM |
| | 11-13' | 2/17/88 | 2/19/88 | 800 | SM |
| | 13-15' | 2/17/88 | 2/19/88 | 45 | SM |
| | 15-17' | 2/17/88 | 2/19/88 | 90 | SP |
| | 17-19' | 2/17/88 | 2/19/88 | 90 | SM |
| | 19-21' | 2/17/88 | 2/19/88 | 100 | SM |

between 20 and 24 feet below the ground surface, which is located in the saprolite. In well CW-5D, a substantial level of soil gas was detected between the 10-foot and 16-foot sample intervals. These intervals are near the groundwater table surface. Well CW-6D showed the highest soil gas concentrations detected in all of the newly installed deep exploratory wells. Soil gas was significantly elevated in every sample interval, with the greatest concentrations found at the 1- to 3-foot and 11- to 13-foot intervals. These intervals approximately correspond to the surface and the water table, respectively. As the OVA instrument is sensitive to methane and because no soil samples were run for VOA analysis, the positive soil gas responses indicated cannot be wholly attributed to volatile organic contaminants even though no visible organic matter was observed in the soil samples.

### 5.3.3 Groundwater Sampling Procedures

5.3.3.1 Introduction - Two rounds of groundwater sampling have been conducted by REWAI at the Havertown PCP site during the Remedial Investigation (RI). The first, or preliminary, sampling round was completed during the week of July 28, 1987, on 10 selected existing monitoring wells. This sampling provided the necessary information to locate and establish proper well specifications for the future installation of the cluster wells. The wells sampled during the preliminary round included: NW-1-81, NW-2-81, NW-3-81, NW-6-81, HAV-02, HAV-07, HAV-08, HAV-10, R-2, and R-4.

A second round of groundwater sampling was performed during the weeks of March 7, 1988, and March 14, 1988, and included 10 of the existing monitoring wells and the 18 newly constructed cluster wells. Monitoring wells utilized during the second groundwater sampling round consisted of existing wells NW-1-81, NW-2-81, NW-3-81, NW-6-81, HAV-02, HAV-05, HAV-07, HAV-08, R-2, R-4, and the newly constructed monitoring wells CW-1 SID through CW-6 SID. The existing monitoring well HAV-10 was replaced by HAV-05 during the second groundwater sampling round since the HAV-10 well barely yielded enough water for sampling and because well HAV-05 was considered to provide a better groundwater sampling point to intercept any groundwater contamination.

Development of all wells was performed by REWAI prior to sampling in order to remove fine sediments and particles, which may have accumulated in the well and sand pack following its construction and to ensure that water samples obtained were representative of groundwater in the vicinity of the well screens.

The following sections provide a brief description of well development and sampling procedures for both sampling rounds. Both the existing and newly installed monitored wells are discussed. Greater detail on these topics may be found in Chapter 5.0 of the approved Havertown PCP SOP. The results of the chemical analyses are presented and discussed in later portions of this section.

5.3.3.2 Well Development and Sampling of Existing Monitoring Wells - Preliminary Round (Round #1) - As a part of well development and during each groundwater sampling round, field measurements were taken for the groundwater parameters, including specific conductance, pH, and temperature. These parameters were used to indicate when sufficient well development had occurred.

Details concerning these measurements are found in Section 5.3.3.5.

5.3.3.2.1 Wells NW-2-81, NW-3-81, and NW-6-81 - Wells NW-2-81, NW-3-81, and NW-6-81 are located on NWP property and were developed and purged using a one-horsepower centrifugal pump fitted with a dedicated one-inch ID, 100 psi, black polyethylene coil pipe and check valve assembly. All purged water was initially collected in a truck mounted water tank and transferred later to the on-site storage facility. The water purged from these wells was chocolate-brown in color and extremely turbid. Greater than three well volumes were purged from each of these wells; however, the water still remained turbid. The wells were generally low yielding (estimated less than 5 gpm), with the exception of NW-2-81, which had a slightly higher sustained yield. After sampling by dedicated stainless steel bailer was completed, the dedicated coil pipe assemblies were placed back into the wells for future use.

5.3.3.2.2 Well R-2 - It was necessary to develop and purge this well with a one-horsepower submersible pump and dedicated coil pipe, as the standing water column was too far below the ground surface for the centrifugal pump to lift. The well maintained a sufficient yield; however, even after developing and purging approximately seven well volumes, the water was still turbid and colored a light brown. Samples for this well were collected from the pumped discharge. Following sampling, the entire pump assembly was removed from the well, the coil pipe and electric wire were cut up and drummed, and the submersible pump was cleaned to the extent possible and stored on-site.

Approximately two feet of free-floating oil was measured in well R-2, using a sonic interface probe.

5.3.3.2.3 Well R-4 - The standing water column in well R-4 was also too far below ground surface for a centrifugal pump to be used. As a result, the well was purged by hand using a dedicated one-inch coil pipe and check valve assembly, as the available submersible pump could not be decontaminated. A trace of free-floating product was indicated by the sonic probe; however, there was no evidence of product in the sampling bailer after at least three well volumes were removed. After sampling by a dedicated stainless steel bailer, the coil pipe assembly was reinserted and left in the well for future use.

5.3.3.2.4 Wells HAV-02, HAV-07, HAV-08, HAV-10, and NW-1-81 - Due to low well yields (estimated less than 1 gpm) and poor well construction which allowed fine sand and silt to enter the well, centrifugal pumps could not be used in these wells. Therefore, the wells were developed and purged using clean, dedicated stainless steel bailers fitted with clean, dedicated nylon rope. Approximately one foot of free-floating oil was found in well HAV-02, while HAV-07, HAV-08, HAV-10 and NW-1-81 contained no free-floating product. Purge water from all of the wells had low turbidity and was essentially colorless. Three well volumes were removed prior to sampling with a new dedicated stainless steel bailer. The oil in well HAV-02 was bailed off and placed into the on-site waste storage tanks before this well was sampled.

5.3.3.3 Well Purging and Sampling of Existing Monitoring Wells (Round #2) - After reviewing the sampling methods and chemical results from the preliminary groundwater sampling of existing monitoring wells, it was decided that a more consistent purging and sampling system was required. In addition, existing monitoring well HAV-10 was dropped from this sampling round and replaced with HAV-05 since it was believed that HAV-05 provided a more representative groundwater sample than HAV-10, which was extremely low yielding during the preliminary sampling round.

To provide a more consistent purging and sampling system for the existing wells during sampling round #2, all wells were purged and sampled using a peristaltic pump and dedicated polyflo and silicon tubing assemblies. All tubing was replaced with new tubing between wells. Used tubing was then placed into sealed and labeled 55-gallon steel drums and stored at NWP when sampling was completed.

A minimum of three well volumes was removed from each well during purging to ensure that the water within the well was representative of the surrounding aquifer. The purged water was collected in a truck-mounted 450-gallon tank prior to being transferred into a 2,500-gallon bulk storage tank on-site. Groundwater parameters consisting of specific conductance, pH, and temperature were obtained during well purging and sampling. Details concerning these measurements are included in Section 5.3.3.5.

5.3.3.4 <u>Well Development and Sampling of Newly Installed Monitoring Wells</u> - The 18 monitoring wells that were installed by REWAI in January and February of 1988 were all equipped with dedicated Well Wizard pumps. These are bladder pumps which are operated by compressed air, which is able to be varied to control the flow rate of the pump according to the yield of the well. Well Wizard pumps were chosen for these wells for various reasons--namely, the pumps can fit into a two-inch well casing; water can be pumped from wells of varying depths; the pumps can be dedicated to wells (which eliminates the chances of cross-contamination); and the pump controller is easily mobilized from one well to another.

The Well Wizard pumps were used for both development and sampling. Development and sampling followed the same criteria and parameters as used for the existing wells which are outlined in Section 5.3.3. The new monitoring wells responded positively to development with Well Wizards, by yielding water with good clarity and consistent parameters. The clarity and consistency of the water obtained and the use of dedicated pumps ensured the quality of the samples and the validity of the chemical results.

5.3.3.5 Field Parameters - Field measurements of groundwater parameters were obtained during both well development and well sampling for each sampling round. These parameters included specific conductance, pH, and temperature. Parameters were taken after a minimum of three well volumes was purged from the well or after the purge water had sufficiently cleared. Samples were collected in a clean, quart-size mason jar after the jar had been rinsed three times with the water to be sampled.

Specific conductance was measured with a YSI Model 33 SCT meter calibrated against a standard solution at 25°C. Because this meter does not correct the specific conductance measured at the field water temperature to its equivalent at 25°C, an immersion thermometer was used to obtain the groundwater temperature so that the specific conductance readings could be corrected to their equivalent temperatures at 25°C. A Beckman pH meter with a two-buffer (4.0 and 7.0) calibration was used to measure the pH of the groundwater.

Field parameters were measured at five-minute intervals until the specific conductance values expressed less than a five percent variance and pH varied less than 0.1 units for three consecutive readings.

Well development and well purging were considered to be completed when this criteria was met. The monitoring wells were then ready for sampling. In some cases, three well volumes could not be purged from a well because of low yield. In this situation, the well was evacuated twice and allowed to recover to at least 75 percent of its original water level without allowing more than 24 hours to pass before obtaining samples.

All purged water was considered contaminated and was collected and transferred to a 2,500-gallon bulk storage tank on-site.

5.3.3.6 Chemical Analysis

5.3.3.6.1 HSL Plus Oil and Grease - REWAI's laboratory subcontractor, CompuChem Laboratories (CompuChem), an EPA-certified laboratory located in Research Triangle Park, North Carolina, provided the analytical services for the HSL plus oil and grease analyses for both groundwater sampling rounds at Havertown.

Glassware and preservatives for sampling were provided by CompuChem in "sample saver" shuttles. Table 5-8 indicates the type of analysis, type and quantity of glassware, type of preservative required (if any), and special preparation necessary for each sample type. After acquisition of samples, the appropriate preservation was performed. All samples were then packaged with cold packs in CompuChem shuttles and shipped with a chain-of-custody via Federal Express Priority One overnight delivery to CompuChem.

Following analysis and QA/QC by CompuChem, data was transferred to REWAI by Federal Express and via computer. Because of the voluminous nature of the data and the associated QA/QC, the original data reports for both sampling rounds were sent to DER for filing and storage. Appendix 2 summarizes the results obtained from both sampling rounds.

5.3.3.6.2 Dioxin and Dibenzofuran - The analysis for dioxin and dibenzofuran during the preliminary sampling round was performed by the EPA, under the contract laboratory program (CLP), by California Analytical Laboratory (CAL) of West Sacramento, California. The groundwater samples analyzed by CAL were part of Case #3151C, which also included the surface water samples from Naylors Run. Copies of the data results were obtained by REWAI through DER. A tabulation of the dioxin/dibenzofuran results of the preliminary sampling round is included in Appendix 2.

The dioxin and dibenzofuran analysis for sampling round #2 was performed for REWAI by ChemWest of Sacramento, California.

Table 5-8

Groundwater Sampling Glassware

| Analysis | Glassware | Number of Bottles | Preservation | Special Preparation |
|---|---|---|---|---|
| Volatile Organic Aromatics | 40 ml glass vial | 2 | cool, dark | No head space in vial |
| Dissolved Metals | 500 ml plastic jar | 2 | pH <2, 30% $HNO_3$ cool, dark | Barrel filter with 0.45 micron membrane filter |
| Acid Extractables Base Neutrals | 1 l amber glass jar | 3 | cool, dark | |
| Oil & Grease | 1 l amber glass jar | 1 | pH <2, 30% $H_2SO4$ cool, dark | |
| Cyanide | 1 l amber glass jar | 1 | pH >12, 30% NaOH | |
| Pesticide/PCBs | 1 l amber glass jar | 2 | cool, dark | |
| *Dioxin/ Dibenzofuran | 1 l amber glass jar | 3 | cool, dark | |

*One amber glass 3-liter jug was used for the dioxin/dibenzofuran analysis during the preliminary sampling round.

In order to maintain consistency between sampling rounds, ChemWest utilized the same analytical procedures and requirements as specified by EPA in their original Special Analytical Services (SAS) Regional Request performed by CAL during the preliminary (round #1) sampling round. A copy of the SAS request for dioxin/dibenzofuran analysis is included in Appendix 3.

### 5.3.4 Hydrogeologic Testing

5.3.4.1 Purpose - Measurement of groundwater levels in as many wells as possible on two separate occasions and slug testing of all newly installed monitoring wells were conducted at the Havertown PCP site for the purpose of:

- Determination of the hydraulic properties of the unconsolidated and bedrock materials.
- Assessment of the interrelationship of the unconsolidated and bedrock aquifers.
- Determination of the direction and rate of groundwater flow at the site.

5.3.4.2 Groundwater Level Monitoring - During the course of fieldwork at the Havertown PCP site, static water level measurements were made in all existing monitoring wells which could be relocated and in all of the newly installed monitoring wells. These wells include the SMC Martin wells, the James Humphreville wells, and the newly installed REWAI wells. All water levels were measured on the same day and in as short a time as possible to allow comparison of all wells. Two complete rounds of water levels were measured and are included here on Table 5-9.

Groundwater levels were measured by a REWAI field crew on March 17, 1988, and April 11, 1988. Measurements were made to a surveyed reference point (top of casing) at each well using an electric water level indicator or a sonic interface probe. The water level instruments were decontaminated between wells by rinsing several times with distilled water. The well number, date and time measured, depth to water, depth to fluid (oil), and any corresponding notes are included in the field notes. Water level elevations are referenced to mean sea level (msl) through a recent survey by a registered Pennsylvania surveyor, under contract to REWAI.

### 5.3.4.3 Aquifer Testing

5.3.4.3.1 Slug Tests - In-situ hydraulic conductivity (permeability) of the saturated unconsolidated materials and bedrock were determined by means of the rising-head and falling-head conductivity or "slug test" method. A data logger recorder coupled with a pressure transducer was utilized to continuously record changes in water levels in response to slug immersion and withdrawal. A minimum of two tests in each direction was performed.

Slug tests were conducted on the 18 newly installed deep, intermediate, and shallow monitoring wells. Each run of the slug test lasted between three and four minutes. The data logger was typically set to record changes in head at the rate of 5 readings per second for the first 60 seconds and at 1 reading per 5 seconds thereafter. A computer program written by Debora B.

Table 5-9

Static Water Level Elevations

| Monitoring Well | PVC Casing Elevation (ft) | Ground Surface Elevation (ft) | Static Water Level Elevation (ft MSL) March 17, 1988 | April 11, 1988 |
|---|---|---|---|---|
| CW-1D | 308.80 | 307.2 | 299.03 | 299.59 |
| CW-1I | 308.82 | 307.3 | 299.05 | 299.23 |
| CW-1S | 309.39 | 307.4 | 299.48 | 300.18 |
| CW-2D | 307.81 | 305.8 | 294.00 | 294.10 |
| CW-2I | 307.59 | 305.9 | 293.95 | 294.15 |
| CW-2S | 307.35 | 305.9 | 294.04 | 294.16 |
| CW-3D | Driveover | 305.13 | 292.78 | 292.83 |
| CW-3I | Driveover | 305.06 | 292.81 | NA |
| CW-3S | Driveover | 304.99 | 292.70 | 292.76 |
| CW-4D | Driveover | 305.66 | 292.74 | 292.80 |
| CW-4I | Driveover | 305.77 | 292.59 | 292.69 |
| CW-4S | Driveover | 305.90 | 292.55 | 292.63 |
| CW-5D | 304.65 | 302.9 | 292.31 | 292.59 |
| CW-5I | 304.43 | 303.0 | 292.41 | 292.37 |
| CW-5S | 304.61 | 303.3 | 292.58 | 292.49 |
| CW-6D | Driveover | 301.34 | 286.20 | 286.24 |
| CW-6I | Driveover | 301.20 | 284.83 | 285.87 |
| CW-6S | Driveover | 301.10 | 285.46 | 285.56 |
| HAV-02 | 307.35 | 307.0 | 291.95/292.85 | 292.02/292.98 |
| HAV-05 | 294.66 | 294.3 | 291.08 | 291.30 |
| HAV-07 | 283.84 | 283.0 | 282.09 | 282.28 |
| HAV-08 | 286.75 | 286.1 | 283.09 | 283.41 |
| HAV-10 | 299.71 | 299.0 | 292.11 | 292.38 |
| R-2 | 314.24 | 312.70 | 289.72/293.82 | 289.95/293.89 |
| R-4 | 315.60 | 316.0 | 295.81 | 295.46 |
| NW-1 | 307.48 | 307.1 | 294.63 | 295.06 |
| NW-2 | 306.45 | 306.6 | 294.43 | 294.45 |
| NW-3 | 307.61 | 307.6 | 299.49 | 300.07 |
| NW-6 | 306.42 | 306.3 | 296.53 | 296.70 |

NOTE: 291.95/292.85 = Water Elevation/Oil Elevation In Well

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Thompson (Groundwater March-April 1987, pp. 212-218) and adapted for use on REWAI's in-house computers was used to calculate and normalize drawdowns by dividing each by the initial (maximum) drawdown. A graph of the normalized drawdowns versus time was made on semilogarithmic paper with the drawdowns plotted on the logarithmic axis and time plotted on the arithmetic axis. A "best fit" line was then statistically interpreted from the analyst's chosen section of the graph by the least-squares method. The appropriate equation to solve for hydraulic conductivity was then selected based upon the well construction, and values for the hydraulic conductivity and regression coefficients were calculated. Data obtained from the slug tests and the results of the hydraulic conductivity calculations are included in Appendix 4.

5.3.4.3.2 Packer Tests - Pressure permeability (packer) tests were run during drilling to determine the permeability of the bedrock zone being tested as an aid to establish well construction. As discussed in Section 5.3.2.1.1, a 10-foot interval was cored into bedrock and the drilling tools removed, an inflatable packer was then seated above the bottom of the hole, and water (from the Philadelphia Suburban Water Company) under pressure was pumped into the test section. Readings of water volume (gallons) were recorded every minute for five consecutive minutes for each of at least three pressure settings. The data and the results of the calculations are included in Appendix 4.

The resulting packer test data were reduced to a corresponding hydraulic conductivity value using the pressure permeability test reduction method presented in the Ground Water Manual, U. S.

Department of the Interior, Bureau of Reclamation, 1985, pp. 249-264.

5.3.4.3.3 Summary of Findings - A direct comparison of the results obtained from the two aquifer test methods reveals a poor correlation between the bedrock hydraulic conductivities calculated by the slug test and packer test methods. This is not unexpected and the comparison should be avoided as the two methods are utilized for different purposes and because of inherent differences associated with each test method. The slug tests were performed to provide an estimate of the hydraulic conductivity of the aquifer materials in the vicinity of the saturated screened intervals. The packer tests, however, were used to provide a field estimate of the bedrock aquifer's hydraulic conductivity at the time of drilling. The packer permeability estimates allowed REWAI geologists to better determine the well construction specifications as each deep exploratory well was drilled. Section 5.3.4.4.3 discusses the hydraulic conductivity of saturated unconsolidated and bedrock materials in greater detail.

5.3.4.4 Groundwater Hydrology

5.3.4.4.1 Water Table Contour Map - Water level and oil thickness were measured at the Havertown PCP site on March 17, 1988, and again on April 11, 1988. Because of the presence of oil in some of the wells, a sample of the oil was collected from well R-2 on April 11, 1988, and analyzed by Wright Lab Services, Inc. (WLSI) of Middletown, Pennsylvania, for specific gravity. As shown in Appendix 2, WLSI reports that the specific gravity for the oil collected from well R-2 was 0.897. Using this specific gravity and the thickness of oil found in each well, ar

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equivalent height of water was calculated for each well with oil in it. This equivalent height of water was then subtracted from the water/air interface elevation to arrive at the hydraulic head of the water table for each respective well. The following formula was used to calculate the hydraulic head of the water table in monitoring wells which contained measurable amounts of oil in them:

$$\text{Hydraulic Head} = E - [f - (f * 0.897)]$$

Where:

E = oil/air interface elevation (feet)
f = oil thickness (feet)
0.897 = specific gravity of the oil

(Adapted from discussion of hydraulic head in Freeze and Cherry, 1979, Chapter 2.2.)

The hydraulic heads for the water table were then plotted next to their respective well location and contoured to produce water table contour maps for each measurement date. An interpretation of each water table contour map yielded the determination that no significant differences existed between the two measurement dates; therefore, only one water table contour map, March 17, 1988, is included here as Plate 4. An inspection of this map indicates that the groundwater has a higher horizontal hydraulic gradient under the NWP and Rittenhouse Circle areas (0.021 and 0.030 respectively), while a lower hydraulic gradient exists under the Swiss Farm Market and the PCG building (0.007). This change in gradient is probably expressed as a change in permeability of subsurface materials. It follows then that the aquifer is heterogeneous and that anisotropic (preferred flow direction) conditions exist in the subsurface. At this time, it is not known how this change in hydraulic gradient affects the migration of the subsurface oil plume. More information is necessary to properly address this question.

The flow of groundwater is apparently southeast to east-southeast across the study area, as indicated by the flow arrows.

5.3.4.4.2 Vertical Groundwater Gradient - An analysis of the water level elevations in the newly installed cluster wells was performed to determine if a vertical gradient exists in the flow of groundwater at the site. Using the March 17, 1988, water level elevation data, the vertical gradients for each cluster well series were calculated by dividing the change in water level elevations by the vertical separation distance between the respective sand-packed intervals. Appendix 5 provides the calculation details.

Table 5-10 lists the vertical gradients calculated for each cluster well series. Overall, the vertical gradients found at the site were small, ranging from 0.001 to 0.028. Comparing the vertical gradient to the average horizontal gradient (0.019) calculated in Section 5.3.4.4.1, the ability of the vertical potential to modify groundwater flow can be considerable at some locations, namely wells CW-1, CW-5, and CW-6.

5.3.4.4.3 Hydraulic Conductivity - As discussed in Section 5.3.4.3.1., slug tests were conducted in the newly installed monitoring wells to provide an estimate of the permeability of the saturated unconsolidated and bedrock materials.

Table 5-10

Vertical Gradients and Direction of Flow

| From Well/ to Well | Respective Water Levels (ft) | Vertical Separation (ft) | Vertical Gradient | Direction of Flow |
|---|---|---|---|---|
| CW-1S/CW-1D | 299.48/299.03 | 34 | 0.013 | Downward |
| CW-2S/CW-2D | 299.04/299.00 | 40 | 0.001 | Downward |
| CW-3S/CW-3D | 292.70/292.78 | 28 | -0.003 | Upward |
| CW-4S/CW-4D | 292.59/292.74 | 30 | -0.005 | Upward |
| CW-5S/CW-5D | 292.58/292.31 | 28 | 0.01 | Downward |
| CW-6S/CW-6D | 285.46/286.20 | 26 | -0.028 | Upward |

Tables 5-11A and B provide a list of the average hydraulic conductivities calculated from all of the slug tests in each of the wells for the saturated unconsolidated and bedrock wells. On Table 5-11A, it is shown that the unconsolidated aquifer has a hydraulic conductivity range from 1 gpd/ft$^2$ to 103 gpd/ft$^2$, while on Table 5-11B, the bedrock aquifer ranges between 6 gpd/ft$^2$ and 182 gpd/ft$^2$. Although the permeability ranges are similar, the three-dimensional distribution of the hydraulic conductivity data are of greater importance.

As previously shown on the water table contour map, Plate 4, the general flow of groundwater is towards the east, or in an east-southeast direction. However, this description refers only to the horizontal plane. To gain a better understanding of groundwater flow dynamics and direction, the vertical component must also be considered. Although the magnitude of variation of groundwater vertical gradients overall was not shown to be large (Section 5.3.4.4.2), it is believed that groundwater flow directions are significantly modified by these variations in vertical gradient. The variations in the vertical gradient of groundwater are believed to be the result of changes in the permeability (hydraulic conductivity) of aquifer materials. The effect that the variation of hydraulic conductivity has on the groundwater contaminant flow will be addressed in Section 5.3.6, Affected Area.

To obtain a better perspective of the spatial variance of permeability of the aquifer materials, the hydraulic conductivity values from Table 5-11 have been plotted next to their respective wells on the geologic fence diagram, Plate 3. From the data presented on the fence diagram, it appears that a trend exists in the permeability of the unconsolidated and bedrock

Table 5-11A

Saturated Unconsolidated Materials Slug Test Results
Average Calculated Hydraulic Conductivities

| Monitoring Well | Hydraulic Conductivity (gpd/ft2) |
|---|---|
| CW-1S | 48 |
| CW-1I | 103 |
| CW-2S | * |
| CW-2I | 72 |
| CW-3S | 8 |
| CW-3I | 27 |
| CW-4S | 8 |
| CW-5S | * |
| CW-6S | 1 |

* Test results did not meet analysis validity requirement of instantaneous water level change.

Table 5-11B

Bedrock Slug Test Results
Average Calculated Hydraulic Conductivities

| Monitoring Well | Hydraulic Conductivity (gpd/ft2) |
|---|---|
| CW-1D | 56 |
| CW-2D | 70 |
| CW-3D | 9 |
| CW-4I | 6 |
| CW-4D | 139 |
| CW-5I | * |
| CW-5D | 182 |
| CW-6I | 7 |
| CW-6D | 6 |

* Test results did not meet analysis validity requirement of instantaneous water level change.

aquifer materials. Beneath NWP, the saturated unconsolidated materials tend to have a moderate to moderately high hydraulic conductivity (48 - 103 gpd/$ft^2$), while under PCG the saturated unconsolidated aquifer materials become less permeable, with hydraulic conductivities being moderately low (1.4 - 27 gpd/$ft^2$). This trend is different in the bedrock aquifer, where the materials under NWP and under the southern portion of PCG property are of moderately high to high permeability (56 - 182 gpd/$ft^2$), while along the northern portion of PCG property, the bedrock hydraulic conductivity becomes moderately low (6 - 9 gpd/$ft^2$). From this information, along with an understanding of the vertical gradients at the site, it appears that a significant change in hydraulic conductivity exists in the subsurface between NWP and PCG.

Accordingly, the groundwater flow is believed to be modified by these characteristics, such that the groundwater flows slightly downward in the unconsolidated materials under NWP and into the bedrock in the vicinity of Eagle Road. From there, the groundwater in the bedrock is believed to continue its slightly downward flow until reaching an area under PCG property, where it begins to rise. This pattern is shown on the geologic cross section, Plate 2, by the equipotential lines and generalized groundwater flow lines.

The equipotential lines represent lines of equal hydraulic head potential, in feet above mean sea level. These were established by placing the hydraulic head potential at each of the cluster wells near the approximate center of the saturated well screen interval in each well. Using the cluster wells in this manner enabled a determination of the groundwater flow in the vertical dimension to be made by contouring between the hydraulic head values. The generalized groundwater flow directions were then estimated by inferring lines perpendicular to the equipotential lines from areas of higher hydraulic head toward areas of lower hydraulic head. The generalized groundwater flow directions were then adjusted as discussed in Section 5.1 of Freeze and Cherry (1979) for refraction caused by flow through formations of differing hydraulic conductivity as shown previously on Plate 2.

5.3.4.4.4 <u>Calculation of Groundwater Velocity</u> - Based upon the water table contour map, Plate 4, and the results of aquifer tests, the average groundwater velocity can be calculated. Valid slug test results from the newly installed monitoring wells were used to estimate hydraulic conductivity and to calculate the average groundwater velocity, as these wells are most representative of the properties of the saprolite water-bearing zone in the study area.

Like many geological variables, the hydraulic conductivity data do not follow a normal distribution; rather, they exhibit a pronouncely skewed distribution. Therefore, to counter the effects that the relatively few number of large values of hydraulic conductivity would have on the mean, the geometric mean of the data was employed to normalize the values.

Calculating the geometric mean for the valid slug test hydraulic conductivity (K) values results in a value of 22 gpd/ft$^2$. This value is converted to ft/day by dividing by 7.48 yielding 2.94 ft/day as the geometric mean of hydraulic conductivity. Horizontal hydraulic gradients (I) were calculated using the water table contour map dated March 17, 1988 (Plate 4) by dividing the change in hydraulic head by the effective distance (dh/L or 0.019). This date was chosen as both static water level measurement dates were taken during the same season. Although field measurements of porosity (n) were not performed, an estimate of 21 percent for the fine sand (saprolite) has been determined from representative values of effective porosity, included here as Table 5-12, and the general textural properties of the unconsolidated deposits examined during the drilling program.

The average groundwater velocity may then be calculated by inserting the aforementioned components into the following formula:

$$\bar{V} = \frac{KI}{n_e}$$

Where:

$\bar{V}$ = estimated average groundwater flow velocity, ft/day

K = geometric mean of hydraulic conductivity, ft/day

I = average hydraulic gradient, dimensionless

$n_e$ = assumed effective porosity value (%)

Solving the equation yields an average groundwater velocity ($\bar{V}$) of 0.27 ft/day. It is important to point out that this velocity is an estimated average velocity and is representative only for a nonreactive solute under ideal conditions. This value would not be applicable to the movement of the oil fraction which differs from water in its density and viscosity, confining it to the water table surface. However, the value is helpful in providing an indication as to the rate of movement of the contaminants dissolved in groundwater.

Table 5-12

Representative Values of Porosity
(After Morris and Johnson, 1967, reference of total porosity, and Pettyjohn et al, 1982, estimate of effective porosity)

| Material | Total Porosity Percent | Effective Porosity Percent |
|---|---|---|
| Gravel, coarse | 28* | 22 |
| Gravel, medium | 32* | 23 |
| Gravel, fine | 34* | 25 |
| Sand, coarse | 39 | 27 |
| Sand, medium | 39 | 26 |
| Sand, fine | 43 | 21 |
| Silt | 46 | 8 |

* Values are for repacked samples; all others are undisturbed.

5.3.4.4.5 <u>Calculation of Groundwater Discharge</u> - In order to determine the approximate quantity of groundwater leaving the present area of investigation, a calculation based upon Darcy's Law was performed which estimates the discharge, in gallons per day (gpd), of groundwater from a given cross-sectional area of the aquifer. The location chosen for the trace of the cross-sectional area began at the sanitary sewer manhole situated approximately 145 feet east of the series CW-3 monitoring wells (refer to base maps, Plate 1) and extends southeastward roughly 325 feet to monitoring well HAV-06. This location provides representative estimates of groundwater exiting the present study area perpendicular to the groundwater flow direction.

$$Q = KIA \text{ (Darcy's Law)}$$

Where:

Q = The discharge through the cross-sectional area of the aquifer per unit time and expressed as ft/day.

K = The hydraulic conductivity of the aquifer materials expressed as ft/day.

I = The change in hydraulic head in the aquifer across the site, in this case, parallel to groundwater flow. This is known as the hydraulic gradient and is expressed dimensionless.

A = The cross-sectional area of the site through which the groundwater is flowing. The orientation was established perpendicular to groundwater flow. The length of the cross-sectional area has been estimated at 325 feet, while based upon chemical data and allowing some margin of error, a saturated thickness of 100 feet has been used in the calculation.

The equation assumes:

- o The aquifer materials are homogeneous and isotropic.
- o The viscosity is constant and equals that of water.
- o The groundwater is flowing at very slow velocities so as to avoid non-laminar flow conditions.

Inserting the results of calculations from previous sections, the equation becomes:

$$Q = (2.94\ \text{ft/day})(0.019)(325\ \text{ft} * 100\ \text{ft}),$$
$$Q = 1815\ \text{ft}^3\text{/day, or}$$
$$Q = 13{,}580\ \text{gpd}$$

Therefore, the anticipated volume of groundwater estimated to pass through the given cross-section of the aquifer would be approximately 13,600 gpd. It is important to realize that this value is based upon assumptions which may be questionable or even invalid; thus, discretion should be used when utilizing this calculated value.

### 5.3.5 Groundwater Sampling Results

Groundwater samples from both sampling rounds were analyzed for the complete Hazardous Substance List, cyanide, oil and grease, and dioxin/dibenzofuran parameters. The analytical work was performed in accordance with the contract required QA/QC procedures delineated in the SOP for the Havertown PCP site. Sampling procedures have been previously addressed in Section 5.3.3, "Groundwater Sampling Procedures," which also states that the original data and QA/QC have been transferred to DER for filing and storage owing to the voluminous nature of the data. Chemical result spread sheets have been provided as tables and in Appendix 2 of this report to summarize the results and ease the readers review of data.

5.3.5.1 Round #1 Preliminary Sampling Round

5.3.5.1.1 Metals - Groundwater samples from 10 selected existing monitoring wells were analyzed for dissolved metals. Significant quantities of iron, manganese, magnesium, calcium, sodium and potassium were present in the water. Heavy metals, including arsenic, chromium, copper, cobalt, and zinc, were also identified in some of the wells sampled. Arsenic was found in three groundwater samples NW-6-81, R-2, and R-2 Dup, at concentrations of 7.9, 4.1, and 7.4 ug/l respectively. Chromium was detected at a concentration of 161 ug/l at only one location, NW-3-81. Zinc was found at concentrations ranging from 18 ug/l at HAV-07 to 581 ug/l at HAV-08. Cobalt ranged from 13 ug/l at R-4 to 539 ug/l at NW-2-81. Copper was detected at 2.9 ug/l at NW-1-81 and 14 ug/l in R-2 Dup. Table 5-13 contains the results of Round #1 metals analysis.

5.3.5.1.2 Volatile Organic Aromatics - Groundwater analysis for VOAs was completed on water samples from the 10 selected existing monitoring wells. The results of this analysis, shown

Table 5-13
Groundwater Round 1 Metal Results

| CMPD CL CMPD-DESC | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| SAMPLE | MW-1 | MW-2 | MW-3 | MW-6 | R-2 | R-2(DUP) | R-4 |
| DATE | 07/30/87 | 07/28/87 | 07/28/87 | 07/28/87 | 07/30/87 | 07/30/87 | 07/30/87 |
| MATRIX | GNDWAT | GNDWAT | GNDWAT | GNDWAT | GNDWAT | GNDWAT | GNDWAT |
| METALS LAB I.D. # | 143948 | 143473 | 143474 | 143475 | 144180 | 144188 | 144182 |
| 101 M ANTIMONY | BDL 48 ug/l | BDL 57 ug/l | BDL 50 ug/l | BDL 50 ug/l | BDL 48 ug/l | BDL 48 ug/l | BDL 48 ug/l |
| 102 M ARSENIC | BDL 3.7 ug/l | BDL 2.3 ug/l | BDL 2.3 ug/l | 7.9 ug/l | 4.1 F ug/l | 7.4 F ug/l | BDL 3.7 ug/l |
| 103 M BERYLLIUM | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 104 M CADMIUM | BDL 4 ug/l | BDL 4 ug/l | BDL 4 ug/l | BDL 4 ug/l | BDL 4 ug/l | BDL 4 ug/l | BDL 4 ug/l |
| 105 M CHROMIUM | BDL 7 ug/l | BDL 10 ug/l | 161 ug/l | BDL 10 ug/l | BDL 7 ug/l | BDL 7 ug/l | BDL 7 ug/l |
| 106 M COPPER | 2.9 ug/l | 6.5 ug/l | 6.5 ug/l | 6.4 ug/l | 13 ug/l | 14 E ug/l | 6.9 E ug/l |
| 107 M LEAD | BDL 2.2 ug/l | 1.3 N F ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 2.2 ug/l | 3.1 F ug/l | BDL 2.2 ug/l |
| 108 M MERCURY | BDL 0.2 ug/l | BDL 0.2 ug/l | BDL 0.2 ug/l | BDL 0.2 ug/l | BDL 0.2 ug/l | BDL 0.2 ug/l | BDL 0.2 ug/l |
| 109 M NICKEL | BDL 21 ug/l | BDL 32 ug/l | BDL 32 ug/l | BDL 32 ug/l | BDL 21 ug/l | BDL 21 ug/l | BDL 21 ug/l |
| 110 M SELENIUM | BDL 2.5 ug/l | BDL 7.5 ug/l | BDL 7.5 ug/l | BDL 1.5 ug/l | BDL 12 ug/l | BDL 7.5 ug/l | BDL 12 ug/l |
| 111 M SILVER | BDL 7 ug/l | BDL 9 ug/l | BDL 9 ug/l | BDL 9 ug/l | BDL 7 ug/l | BDL 12 ug/l | BDL 7 ug/l |
| 112 M THALLIUM | 2.9 F ug/l | BDL 1.4 ug/l | 1.7 F ug/l | BDL 1.4 ug/l | BDL 2.2 ug/l | BDL 11 ug/l | BDL 2.2 ug/l |
| 113 M ZINC | 48 E ug/l | 157 ug/l | 28 ug/l | 81 ug/l | 322 E ug/l | 358 ug/l | 68 ug/l |
| 114 M BARIUM | 102 ug/l | 27 E ug/l | 19 E ug/l | 32 E ug/l | 42 ug/l | 43 ug/l | 90 ug/l |
| 115 M IRON | 6090 ug/l | 60 ug/l | 47 ug/l | 11100 ug/l | 5430 ug/l | 9500 ug/l | BDL 4 ug/l |
| 116 M MANGANESE | 566 ug/l | 10900 ug/l | 5390 ug/l | 8200 ug/l | 19700 ug/l | 20400 ug/l | 76 ug/l |
| 117 M VANADIUM | 8.4 ug/l | 6.7 ug/l | 8 ug/l | 6.5 ug/l | 9 ug/l | 15 ug/l | 9.5 ug/l |
| 118 M ALUMINUM | BDL 45 ug/l | BDL 57 ug/l | 163 ug/l | BDL 57 ug/l | BDL 45 ug/l | 48 ug/l | BDL 45 ug/l |
| 120 M COBALT | 19 E ug/l | 539 ug/l | 124 ug/l | 78 ug/l | 111 E ug/l | 118 E ug/l | 13 E ug/l |
| 121 M MAGNESIUM | 10900 E ug/l | 14000 E ug/l | 31200 E ug/l | 12500 E ug/l | 24900 E ug/l | 25500 E ug/l | 12100 E ug/l |
| 129 M CALCIUM | 33500 ug/l | 36700 ug/l | 88000 ug/l | 39100 ug/l | 60000 ug/l | 61900 ug/l | 13300 ug/l |
| 130 M SODIUM | 30600 E ug/l | 21000 ug/l | 21100 E ug/l | 27300 E ug/l | 72100 E ug/l | 74600 E ug/l | 14400 E ug/l |
| 131 M POTASSIUM | 8100 ug/l | 3870 ug/l | BDL 3600 ug/l | 5920 ug/l | 18300 ug/l | 19000 ug/l | 7130 ug/l |

Table 5-13 (Cont'd)

Groundwater Round 1 Metals Results

| CMPD CL CMPD-DESC | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SITE | 86021 | | 86021 | | 86021 | | 86021 | |
| SAMPLE | HAV-2 | | HAV-7 | | HAV-8 | | HAV-10 | |
| DATE | 07/30/87 | | 08/01/87 | | 08/01/87 | | 08/01/87 | |
| MATRIX | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | |
| METALS LAB I.D. # | 144181 | | 144175 | | 144177 | | 144179 | |
| 101 M ANTIMONY | BDL | 48 ug/l | BDL | 48 ug/l | BDL | 48 ug/l | BDL | 48 ug/l |
| 102 M ARSENIC | BDL | 3.7 ug/l | BDL | 3.7 ug/l | BDL | 3.7 ug/l | BDL | 3.7 ug/l |
| 103 M BERYLLIUM | BDL | 1 ug/l | BDL | 1 ug/l | BDL | 1 ug/l | BDL | 1 ug/l |
| 104 M CADMIUM | BDL | 4 ug/l | BDL | 4 ug/l | BDL | 4 ug/l | BDL | 4 ug/l |
| 105 M CHROMIUM | BDL | 7 ug/l | BDL | 7 ug/l | BDL | 7 ug/l | BDL | 7 ug/l |
| 106 M COPPER | 3.4 | ug/l | 3.5 | ug/l | 4.6 | ug/l | 6.4 | ug/l |
| 107 M LEAD | BDL | 2.2 ug/l | BDL | 2.2 ug/l | BDL | 2.2 ug/l | 2.5 | N F ug/l |
| 108 M MERCURY | BDL | 0.2 ug/l | BDL | 0.2 ug/l | BDL | 0.2 ug/l | BDL | 0.2 ug/l |
| 109 M NICKEL | BDL | 21 ug/l | BDL | 21 ug/l | BDL | 21 ug/l | BDL | 21 ug/l |
| 110 M SELENIUM | BDL | 12 ug/l | BDL | 12 ug/l | BDL | 12 ug/l | 5.1 | N F ug/l |
| 111 M SILVER | BDL | 7 ug/l | BDL | 7 ug/l | BDL | 7 ug/l | BDL | 7 ug/l |
| 112 M THALLIUM | 14 | F ug/l | 2.4 | F ug/l | 3.4 | F ug/l | 3.6 | ug/l |
| 113 M ZINC | 75 | E ug/l | 18 | E ug/l | 581 | E ug/l | 35 | E ug/l |
| 114 M BARIUM | 63 | ug/l | 117 | ug/l | 122 | ug/l | 60 | ug/l |
| 115 M IRON | 6460 | ug/l | 4660 | ug/l | 268 | ug/l | 191 | ug/l |
| 116 M MANGANESE | 20900 | ug/l | 1450 | ug/l | 253 | ug/l | 874 | ug/l |
| 117 M VANADIUM | 9.6 | ug/l | 9.2 | ug/l | 10 | ug/l | 9.9 | ug/l |
| 118 M ALUMINUM | BDL | 45 ug/l | BDL | 45 ug/l | BDL | 45 ug/l | BDL | 45 ug/l |
| 120 M COBALT | 142 | E ug/l | 17 | E ug/l | 13 | E ug/l | 17 | E ug/l |
| 121 M MAGNESIUM | 27500 | E ug/l | 15700 | E ug/l | 43200 | E ug/l | 11900 | E ug/l |
| 129 M CALCIUM | 39700 | ug/l | 40500 | ug/l | 38100 | ug/l | 25900 | ug/l |
| 130 M SODIUM | 59000 | E ug/l | 23700 | E ug/l | 11700 | E ug/l | 12400 | E ug/l |
| 131 M POTASSIUM | 12600 | ug/l | 13900 | ug/l | 10700 | ug/l | 9100 | ug/l |

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on Table 5-14, indicate the presence of ten (10) chemicals usually associated with solvent and gasoline/fuel oil contamination, namely benzene; 1,2-dichloroethane; 1,2-dichloropropane; ethylbenzene; toluene; trans-1,2-dichloroethene; 1,1,1-trichloroethane; trichloroethene; vinyl chloride; and xylene. In addition, two contaminants, methylene chloride and acetone, were also found; however, these are common laboratory contaminants. Accordingly, it is helpful to consider the possibility that the former service station at Young's Produce, the automotive repair shops west of the site, and/or the operations of NWP may have contributed to this contamination in addition to the PCP-laden fuel oil plume.

To examine the areal distribution of these chemicals, a total value for the VOA concentration was calculated for each well by summing the results of VOAs identified above the detection limits. The total VOA results ranged from 1.3 to 3,227 ug/l. The purpose for examining the total VOA concentrations is that it allows for easy characterization of the general VOA distribution on the site, without the need to review individual species. Figure 5-12 presents the total VOAs, in ug/l, for the groundwater samples taken during the preliminary sampling round.

The map contains a number of important features. First, a significantly elevated level of total VOAs was found to be present in the groundwater between NWP and PCG, with respect to the other wells sampled. Because groundwater flows east-southeast across the site, the contamination present in the wells sampled along the western portion of the site may indicate additional contaminant sources other than the fuel oil. On the eastern portion of the study area, the total VOAs are lower; however, it is apparent that the contamination extends beyond the

Table 5-14

Groundwater Round 1 Volatile Organic Results

| CMPD | CL | CMPD-DESC | 84021 MW-1 07/30/87 GNDWAT | | 84021 MW-2 07/28/87 GNDWAT | | 84021 MW-3 07/28/87 GNDWAT | | 84021 MW-6 07/28/87 GNDWAT | | 84021 R-2 07/30/87 GNDWAT | | 84021 R-2(DUP) 07/30/87 GNDWAT | | 84021 R-4 07/30/87 GNDWAT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VOC LAB I.D. # | 143946 | | 143468 | | 143469 | | 143470 | | 143941 | | 143944 | | 143945 | |
| 203 | V | BENZENE | 1 | J ug/l | 1.5 | J ug/l | 1.1 | J ug/l | 2.9 | J ug/l | 20 | J ug/l | 10 | J ug/l | BDL | 5 ug/l |
| 205 | V | BROMOFORM | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 206 | V | CARBON TETRACHLORIDE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 207 | V | CHLOROBENZENE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 208 | V | DIBROMOCHLOROMETHANE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 209 | V | CHLOROETHANE | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l | BDL | 50 ug/l | BDL | 10 ug/l |
| 210 | V | 2-CHLOROETHYLVINYLETHER | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l | BDL | 50 ug/l | BDL | 10 ug/l |
| 211 | V | CHLOROFORM | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 212 | V | BROMODICHLOROMETHANE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 214 | V | 1,1-DICHLOROETHANE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 215 | V | 1,2-DICHLOROETHANE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 7.9 | ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 216 | V | 1,1-DICHLOROETHENE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 217 | V | 1,2-DICHLOROPROPANE | BDL | 5 ug/l | BDL | 5 ug/l | 1.6 | J ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 218 | V | CIS-1,3-DICHLOROPROPENE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 219 | V | ETHYLBENZENE | 6.2 | ug/l | 11 | ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 340 | ug/l | 120 | ug/l | BDL | 5 ug/l |
| 220 | V | BROMOMETHANE | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l | BDL | 50 ug/l | BDL | 10 ug/l |
| 221 | V | CHLOROMETHANE | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l | BDL | 50 ug/l | BDL | 10 ug/l |
| 222 | V | METHYLENE CHLORIDE | 4.2 | J B ug/l | 1.2 | J ug/l | 2.3 | J ug/l | 1.6 | J ug/l | 11 | J B ug/l | 42 | ug/l | 6.6 | B ug/l |
| 223 | V | 1,1,2,2-TETRACHLOROETHANE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 224 | V | TETRACHLOROETHENE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 225 | V | TOLUENE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 230 | ug/l | 110 | ug/l | BDL | 5 ug/l |
| 226 | V | TRANS-1,2-DICHLOROETHENE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 52 | ug/l | 40 | ug/l | 35 | ug/l | BDL | 5 ug/l |
| 227 | V | 1,1,1-TRICHLOROETHANE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 228 | V | 1,1,2-TRICHLOROETHANE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 229 | V | TRICHLOROETHENE | BDL | 5 ug/l | 1.2 | J ug/l | 2.8 | J ug/l | 8.3 | ug/l | 86 | ug/l | 40 | ug/l | BDL | 5 ug/l |
| 231 | V | VINYL CHLORIDE | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | 9.4 | J ug/l | BDL | 50 ug/l | BDL | 50 ug/l | BDL | 10 ug/l |
| 250 | V | TRANS-1,3-DICHLOROPROPENE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 251 | V | STYRENE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 252 | V | ACETONE | 7.1 | J B ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | 100 | ug/l | 220 | ug/l | BDL | 10 ug/l |
| 253 | V | 2-BUTANONE | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l | BDL | 50 ug/l | BDL | 10 ug/l |
| 254 | V | CARBON DISULFIDE | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l | BDL | 25 ug/l | BDL | 5 ug/l |
| 255 | V | 2-HEXANONE | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l | BDL | 50 ug/l | BDL | 10 ug/l |
| 256 | V | 4-METHYL-2-PENTANONE | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l | BDL | 50 ug/l | BDL | 10 ug/l |
| 257 | V | VINYL ACETATE | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l | BDL | 50 ug/l | BDL | 10 ug/l |
| 289 | V | XYLENES (TOTAL) | 42 | ug/l | 76 | ug/l | 4.6 | J ug/l | BDL | 5 ug/l | 2400 | ug/l | 970 | ug/l | BDL | 5 ug/l |

Table 5-14 (Cont'd)

Groundwater Round 1 Volatile Organic Results

| CMPD | CL | CMPD-DESC | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 86021 | | 86021 | | 86021 | | 86021 | |
| | | SAMPLE | HAV-2 | | HAV-7 | | HAV-8 | | HAV-10 | |
| | | DATE | 07/30/87 | | 08/01/87 | | 08/01/87 | | 08/01/87 | |
| | | MATRIX | GWDWAT | | GWDWAT | | GWDWAT | | GWDWAT | |
| | | VOC LAB I.D. # | 143947 | | 144124 | | 144128 | | 144129 | |
| 203 | V | BENZENE | 6.2 | J ug/l | BDL | 5 ug/l | 9 | ug/l | BDL | 5 ug/l |
| 205 | V | BROMOFORM | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 206 | V | CARBON TETRACHLORIDE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 207 | V | CHLOROBENZENE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 208 | V | DIBROMOCHLOROMETHANE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 209 | V | CHLOROETHANE | BDL | 14 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 210 | V | 2-CHLOROETHYLVINYLETHER | BDL | 14 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 211 | V | CHLOROFORM | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 212 | V | BROMODICHLOROMETHANE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 214 | V | 1,1-DICHLOROETHANE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 215 | V | 1,2-DICHLOROETHANE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 216 | V | 1,1-DICHLOROETHENE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 217 | V | 1,2-DICHLOROPROPANE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 218 | V | CIS-1,3-DICHLOROPROPENE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 219 | V | ETHYLBENZENE | 7.7 | ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 220 | V | BROMOMETHANE | BDL | 14 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 221 | V | CHLOROMETHANE | BDL | 14 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 222 | V | METHYLENE CHLORIDE | 20 | B ug/l | 2.5 | J B ug/l | 1.4 | J B ug/l | 1.3 | J B ug/l |
| 223 | V | 1,1,2,2-TETRACHLOROETHANE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 224 | V | TETRACHLOROETHENE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 225 | V | TOLUENE | 20 | ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 226 | V | TRANS-1,2-DICHLOROETHENE | 10 | ug/l | 1.8 | J ug/l | 3.5 | J ug/l | BDL | 5 ug/l |
| 227 | V | 1,1,1-TRICHLOROETHANE | BDL | 6.8 ug/l | BDL | 5 ug/l | 3.5 | J ug/l | BDL | 5 ug/l |
| 228 | V | 1,1,2-TRICHLOROETHANE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 229 | V | TRICHLOROETHENE | 21 | ug/l | BDL | 5 ug/l | 5.4 | ug/l | BDL | 5 ug/l |
| 231 | V | VINYL CHLORIDE | BDL | 14 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 250 | V | TRANS-1,3-DICHLOROPROPENE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 251 | V | STYRENE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 252 | V | ACETONE | 36 | ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 253 | V | 2-BUTANONE | BDL | 14 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 254 | V | CARBON DISULFIDE | BDL | 6.8 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 255 | V | 2-HEXANONE | BDL | 14 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 256 | V | 4-METHYL-2-PENTANONE | BDL | 14 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 257 | V | VINYL ACETATE | BDL | 14 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 289 | V | XYLENES (TOTAL) | 240 | ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |

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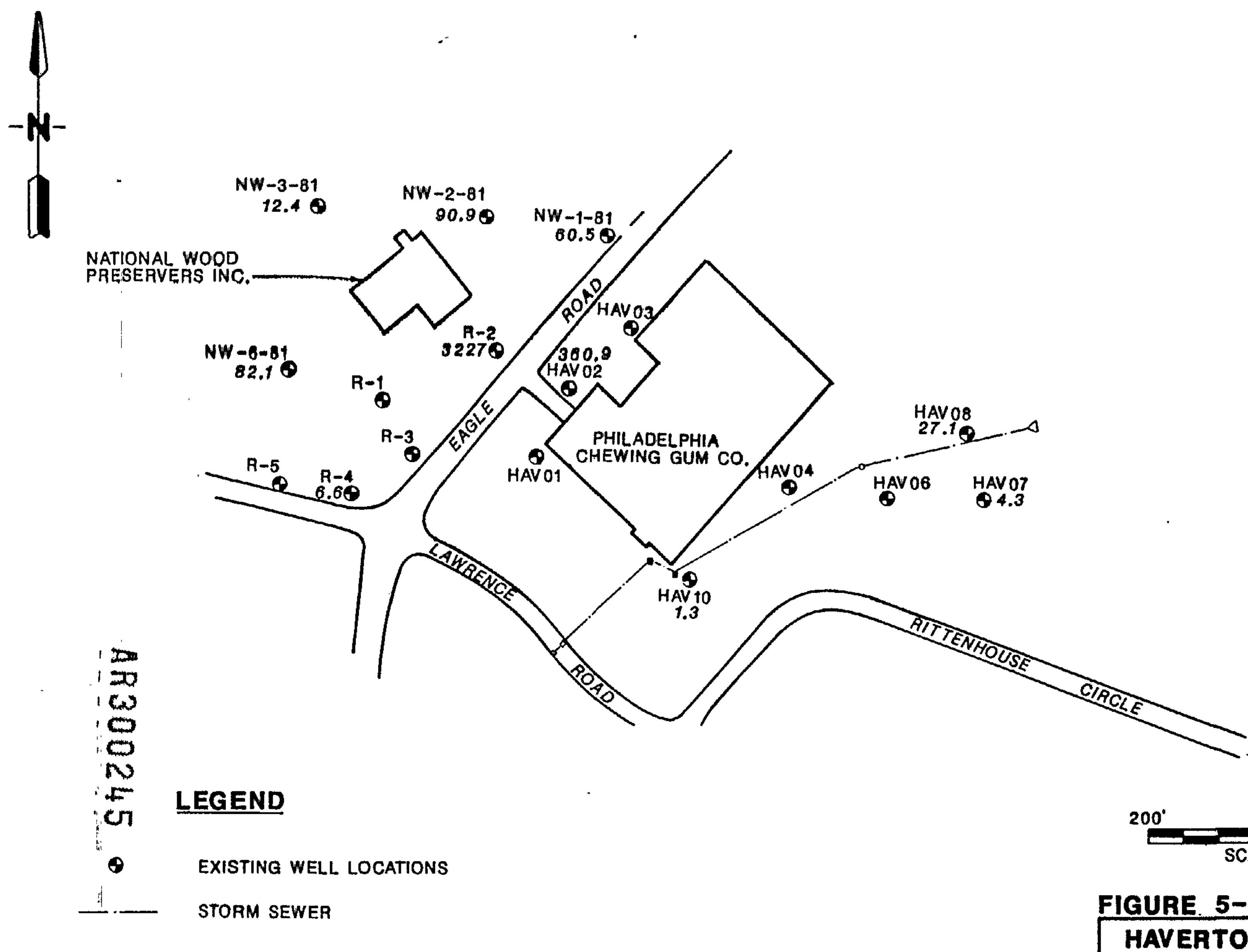


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**FIGURE 5-12**

**HAVERTOWN PCP SITE**
**HAVERTOWN, PA**

TOTAL VOLATILE ORGANIC
AROMATICS (ug/l)
GROUNDWATER-PRELIMINARY ROUND

| drawn CCS | approved JHW | drawing no. |
|---|---|---|
| checked JST | date 5-20-88 | 86021-032-AA |

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earth resourc sultants
middletown pennsylvania

existing monitoring well network (well HAV-07). As shown on Figure 5-12, the area around the PCG property lacked monitoring points to further define the extent of contamination. For this reason, four of the six cluster well sites were drilled on the PCG property so as to better establish the extent of groundwater contamination.

For two reasons, the data presented on the total VOA map were not contoured. First, it is believed that the total VOA values presented on the map may vary significantly as a result of the variety of sampling methods employed during the preliminary (Round #1) groundwater sampling round. Second, because geology in the vicinity of some of the existing wells is either uncertain or unknown, it is unclear whether or not the groundwater samples obtained were composite water-bearing zone samples or not. Therefore, because either or both of these points would alter any delineation of a contaminant plume, an interpretation is made in Section 2.3.5.2 using Round #2 groundwater chemistry data from both the existing and new monitoring wells.

5.3.5.1.3 Base Neutrals/Acid Extractables - Groundwater samples from the 10 selected existing monitoring wells were analyzed for base neutral and acid extractable (BNA) compounds. The results of this analysis, shown in Table 5-15, indicate substantial groundwater contamination by BNA compounds. The most elevated BNA compounds identified in these samples are, naphthalene, phenanthrene, 2-methylnaphthalene, and pentachlorophenol.

Table 5-15

Groundwater Round 1 Base Neutral/Acid Extractable Results

| CMPD | CL | CMPD-DESC | 86021 MW-1 07/30/87 GNDWAT | | 86021 MW-2 07/28/87 GNDWAT | | 86021 MW-3 07/28/87 GNDWAT | | 86021 MW-6 07/28/87 GNDWAT | | 86021 R-2 07/30/87 GNDWAT | | 86021 R-2(DUP) 07/30/87 GNDWAT | | 86021 R-4 07/30/87 GNDWAT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ACID EXTRACT./BASE NEUT. LAB ID # | 144123 | | 143468 | | 143469 | | 143470 | | 144159 | | 144171 | | 144163 | |
| 401 | B | ACENAPHTHENE | 140 | ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 210 | J ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 402 | B | ACENAPHTHYLENE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 403 | B | ANTHRACENE | 160 | ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 88 | J ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 405 | B | BENZO(A)ANTHRACENE | 19 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 406 | B | BENZO(A)PYRENE | 3.4 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 407 | B | BENZO(B)FLUORANTHENE | 5.2 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 408 | B | BENZO(G,H,I)PERYLENE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 409 | B | BENZO(K)FLUORANTHENE | 5.2 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 410 | B | BIS(-2-CHLOROETHOXY)METHANE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 411 | B | BIS(-2-CHLOROETHYL)ETHER | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 412 | B | BIS(2-CHLOROISOPROPYL)ETHER | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 413 | B | BIS(2-ETHYLHEXYL)PHTHALATE | 2.8 | J ug/l | 7.8 | J ug/l | 2.6 | J ug/l | 7.6 | ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 414 | B | 4-BROMOPHENYL-PHENYLETHER | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 415 | B | BUTYLBENZYLPHTHALATE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 416 | B | 2-CHLORONAPHTHALENE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 417 | B | 4-CHLOROPHENYL-PHENYLETHER | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 418 | B | CHRYSENE | 22 | ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 419 | B | DIBENZ(A,H)ANTHRACENE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 420 | B | 1,2-DICHLOROBENZENE | BDL | 20 ug/l | BDL | 20 ug/l | 2.8 | J ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 421 | B | 1,3-DICHLOROBENZENE | BDL | 20 ug/l | BDL | 20 ug/l | 2.2 | J ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 422 | B | 1,4-DICHLOROBENZENE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 423 | B | 3,3'-DICHLOROBENZIDINE | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 800 ug/l | BDL | 400 ug/l | BDL | 40 ug/l |
| 424 | B | DIETHYLPHTHALATE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 425 | B | DIMETHYL PHTHALATE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 426 | B | DI-N-BUTYLPHTHALATE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 427 | B | 2,4-DINITROTOLUENE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 428 | B | 2,6-DINITROTOLUENE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |
| 429 | B | DI-N-OCTYL PHTHALATE | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 400 ug/l | BDL | 200 ug/l | BDL | 20 ug/l |

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Table 5-15 (Cont'd)

Groundwater Round 1 Base Neutral/Acid Extractable Results

| CMPD | CL | CMPD-DESC | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
|---|---|---|---|---|---|---|---|---|---|
| | | SAMPLE | MW-1 | MW-2 | MW-3 | MW-6 | R-2 | R-2(DUP) | R-4 |
| | | DATE | 07/30/87 | 07/28/87 | 07/28/87 | 07/28/87 | 07/30/87 | 07/30/87 | 07/30/87 |
| | | MATRIX | GNDWAT | GNDWAT | GNDWAT | GNDWAT | GNDWAT | GNDWAT | GNDWAT |
| | | ACID EXTRACT./BASE NEUT. LAB ID # | 144123 | 143448 | 143469 | 143470 | 144159 | 144171 | 144163 |
| 431 | B | FLUORANTHENE | 100 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | 84 J ug/l | 60 J ug/l | BDL 20 ug/l |
| 432 | B | FLUORENE | BDL 20 ug/l | 6.6 J ug/l | BDL 20 ug/l | BDL 20 ug/l | 380 J ug/l | 190 J ug/l | BDL 20 ug/l |
| 433 | B | HEXACHLOROBENZENE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 434 | B | HEXACHLOROBUTADIENE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 435 | B | HEXACHLOROCYCLOPENTADIENE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 436 | B | HEXACHLOROETHANE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 437 | B | INDENO(1,2,3-CD)PYRENE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 438 | B | ISOPHORONE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 439 | B | NAPHTHALENE | 340 D ug/l | 240 ug/l | 81 ug/l | BDL 20 ug/l | 980 ug/l | 1200 ug/l | BDL 20 ug/l |
| 440 | B | NITROBENZENE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 442 | B | N-NITROSO-DI-N-PROPYLAMINE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 443 | B | N-NITROSODIPHENYLAMINE(1) | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 444 | B | PHENANTHRENE | 790 D ug/l | 8 J ug/l | BDL 20 ug/l | BDL 20 ug/l | 1200 ug/l | 540 ug/l | BDL 20 ug/l |
| 445 | B | PYRENE | 180 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | 110 J ug/l | 90 J ug/l | BDL 20 ug/l |
| 446 | B | 1,2,4-TRICHLOROBENZENE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 474 | B | BENZYL ALCOHOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 475 | B | 4-CHLOROANILINE | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 476 | B | DIBENZOFURAN | 83 ug/l | 6.2 J ug/l | BDL 20 ug/l | BDL 20 ug/l | 160 J ug/l | 90 J ug/l | BDL 20 ug/l |
| 477 | B | 2-METHYLNAPHTHALENE | 720 D ug/l | 210 ug/l | 27 ug/l | BDL 20 ug/l | 3500 ug/l | 2400 ug/l | BDL 20 ug/l |
| 478 | B | 2-NITROANILINE | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 2000 ug/l | BDL 1000 ug/l | BDL 100 ug/l |
| 479 | B | 3-NITROANILINE | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 2000 ug/l | BDL 1000 ug/l | BDL 100 ug/l |
| 480 | B | 4-NITROANILINE | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 2000 ug/l | BDL 1000 ug/l | BDL 100 ug/l |
| 601 | A | 2-CHLOROPHENOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 602 | A | 2,4-DICHLOROPHENOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 603 | A | 2,4-DIMETHYLPHENOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 604 | A | 4,6-DINITRO-2-METHYLPHENOL | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 2000 ug/l | BDL 1000 ug/l | BDL 100 ug/l |
| 605 | A | 2,4-DINITROPHENOL | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 2000 ug/l | BDL 1000 ug/l | BDL 100 ug/l |
| 606 | A | 2-NITROPHENOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 607 | A | 4-NITROPHENOL | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 2000 ug/l | BDL 1000 ug/l | BDL 100 ug/l |
| 608 | A | 4-CHLORO-3-METHYLPHENOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 609 | A | PENTACHLOROPHENOL | 860 J D ug/l | 2800 ug/l | 30 J ug/l | BDL 20 ug/l | 4200 ug/l | 4500 J D ug/l | 3.4 J ug/l |
| 610 | A | PHENOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 611 | A | 2,4,6-TRICHLOROPHENOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 620 | A | 2-METHYLPHENOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 622 | A | 4-METHYLPHENOL | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 400 ug/l | BDL 200 ug/l | BDL 20 ug/l |
| 625 | A | BENZOIC ACID | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 2000 ug/l | BDL 1000 ug/l | BDL 100 ug/l |
| 626 | A | 2,4,5-TRICHLOROPHENOL | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 2000 ug/l | BDL 1000 ug/l | BDL 100 ug/l |

Table 5-15 (Cont'd)

Groundwater Round 1 Base Neutral/Acid Extractable Results

| CMPD | CL | CMPD-DESC | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 86021 | | 86021 | | 86021 | | 86021 | |
| | | SAMPLE | MAW-2 | | MAW-7 | | MAW-8 | | MAW-10 | |
| | | DATE | 07/30/87 | | 08/01/87 | | 08/01/87 | | 08/01/87 | |
| | | MATRIX | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | |
| | | ACID EXTRACT./BASE NEUT. LAB ID # | 144160 | | 144132 | | 144140 | | 144158 | |
| 401 | B | ACENAPHTHENE | 300 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 402 | B | ACENAPHTHYLENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 403 | B | ANTHRACENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 405 | B | BENZO(A)ANTHRACENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 406 | B | BENZO(A)PYRENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 407 | B | BENZO(B)FLUORANTHENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 408 | B | BENZO(G,H,I)PERYLENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 409 | B | BENZO(K)FLUORANTHENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 410 | B | BIS(-2-CHLOROETHOXY)METHANE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 411 | B | BIS(-2-CHLOROETHYL)ETHER | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 412 | B | BIS(2-CHLOROISOPROPYL)ETHER | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 413 | B | BIS(2-ETHYLHEXYL)PHTHALATE | BDL | 2000 ug/l | 2.6 | J ug/l | 3 | J ug/l | BDL | 20 ug/l |
| 414 | B | 4-BROMOPHENYL-PHENYLETHER | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 415 | B | BUTYLBENZYLPHTHALATE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 416 | B | 2-CHLORONAPHTHALENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 417 | B | 4-CHLOROPHENYL-PHENYLETHER | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 418 | B | CHRYSENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 419 | B | DIBENZ(A,H)ANTHRACENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 420 | B | 1,2-DICHLOROBENZENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 421 | B | 1,3-DICHLOROBENZENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 422 | B | 1,4-DICHLOROBENZENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 423 | B | 3,3'-DICHLOROBENZIDINE | BDL | 4000 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l |
| 424 | B | DIETHYLPHTHALATE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 425 | B | DIMETHYL PHTHALATE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 426 | B | DI-N-BUTYLPHTHALATE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 2.2 | 2 ug/l |
| 427 | B | 2,4-DINITROTOLUENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 428 | B | 2,6-DINITROTOLUENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 429 | B | DI-N-OCTYL PHTHALATE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |

Table 5-15 (Cont'd)

Groundwater Round 1 Base Neutral/Acid Extractable Results

| CMPD | CL | CMPD-DESC | SITE 86021 | | SITE 86021 | | SITE 86021 | | SITE 86021 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | SAMPLE | HAV-2 | | HAV-7 | | HAV-8 | | HAV-10 | |
| | | DATE | 07/30/87 | | 08/01/87 | | 08/01/87 | | 08/01/87 | |
| | | MATRIX | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | |
| | | ACID EXTRACT./BASE NEUT. LAB ID # | 144160 | | 144132 | | 144140 | | 144158 | |
| 431 | B | FLUORANTHENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 432 | B | FLUORENE | 500 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 433 | B | HEXACHLOROBENZENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 434 | B | HEXACHLOROBUTADIENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 435 | B | HEXACHLOROCYCLOPENTADIENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 436 | B | HEXACHLOROETHANE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 437 | B | INDENO(1,2,3-CD)PYRENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 438 | B | ISOPHORONE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 439 | B | NAPHTHALENE | 3800 | ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 440 | B | NITROBENZENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 442 | B | N-NITROSO-DI-N-PROPYLAMINE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 443 | B | N-NITROSODIPHENYLAMINE(1) | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 444 | B | PHENANTHRENE | 1500 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 445 | B | PYRENE | 200 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 446 | B | 1,2,4-TRICHLOROBENZENE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 474 | B | BENZYL ALCOHOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 475 | B | 4-CHLOROANILINE | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 476 | B | DIBENZOFURAN | 220 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 477 | B | 2-METHYLNAPHTHALENE | 5000 | ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 478 | B | 2-NITROANILINE | BDL | 10000 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 479 | B | 3-NITROANILINE | BDL | 10000 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 480 | B | 4-NITROANILINE | BDL | 10000 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 601 | A | 2-CHLOROPHENOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 602 | A | 2,4-DICHLOROPHENOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 603 | A | 2,4-DIMETHYLPHENOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 604 | A | 4,6-DINITRO-2-METHYLPHENOL | BDL | 10000 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 605 | A | 2,4-DINITROPHENOL | BDL | 10000 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 606 | A | 2-NITROPHENOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 607 | A | 4-NITROPHENOL | BDL | 10000 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 608 | A | 4-CHLORO-3-METHYLPHENOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 609 | A | PENTACHLOROPHENOL | 13000 | ug/l | BDL | 20 ug/l | 1000 | D ug/l | 12 | J ug/l |
| 610 | A | PHENOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 611 | A | 2,4,6-TRICHLOROPHENOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 620 | A | 2-METHYLPHENOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 622 | A | 4-METHYLPHENOL | BDL | 2000 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 625 | A | BENZOIC ACID | BDL | 10000 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 626 | A | 2,4,5-TRICHLOROPHENOL | BDL | 10000 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |

A total BNA map was produced in the same fashion as the VOA map described in the previous section, and is presented here as Figure 5-13.

The pattern of total BNA contamination in groundwater appears to be similar to that for total VOA contamination. The groundwater between NWP and PCG has significantly higher total BNA concentrations than other wells sampled. The BNA compounds are likewise not controlled and extend outside of the monitoring well network. The moderately elevated BNA concentrations along the northern part of NWP also indicate that the extent of BNA contamination cannot be entirely determined by the present monitoring network, although it appears to extend beyond the NWP property in this direction. The PCG property also lacked the monitoring wells to delineate the dissolved contaminant plume further. In addition, the lower BNA value in HAV-07, with respect to well HAV-08, downgradient of the storm sewer may be the result of well placement rather than reflective of any influence of the storm sewer on the contaminated groundwater flow. This topic is addressed in later sections. For reasons presented in the previous section, the total BNA data were not contoured.

5.3.5.1.4 Pesticides/PCBs - Pesticide and polychlorinated biphenyl analyses were performed on water samples taken from the 10 selected existing monitoring wells during the preliminary sampling round. The results, shown in Table 5-16, indicate that PCBs were not detected in any of the groundwater samples taken. Three pesticides, aldrin, beta-BHC, and dieldrin, were detected in five of the 10 wells sampled. Two of the wells, R-2 and HAV-02, had pesticide concentrations significantly higher

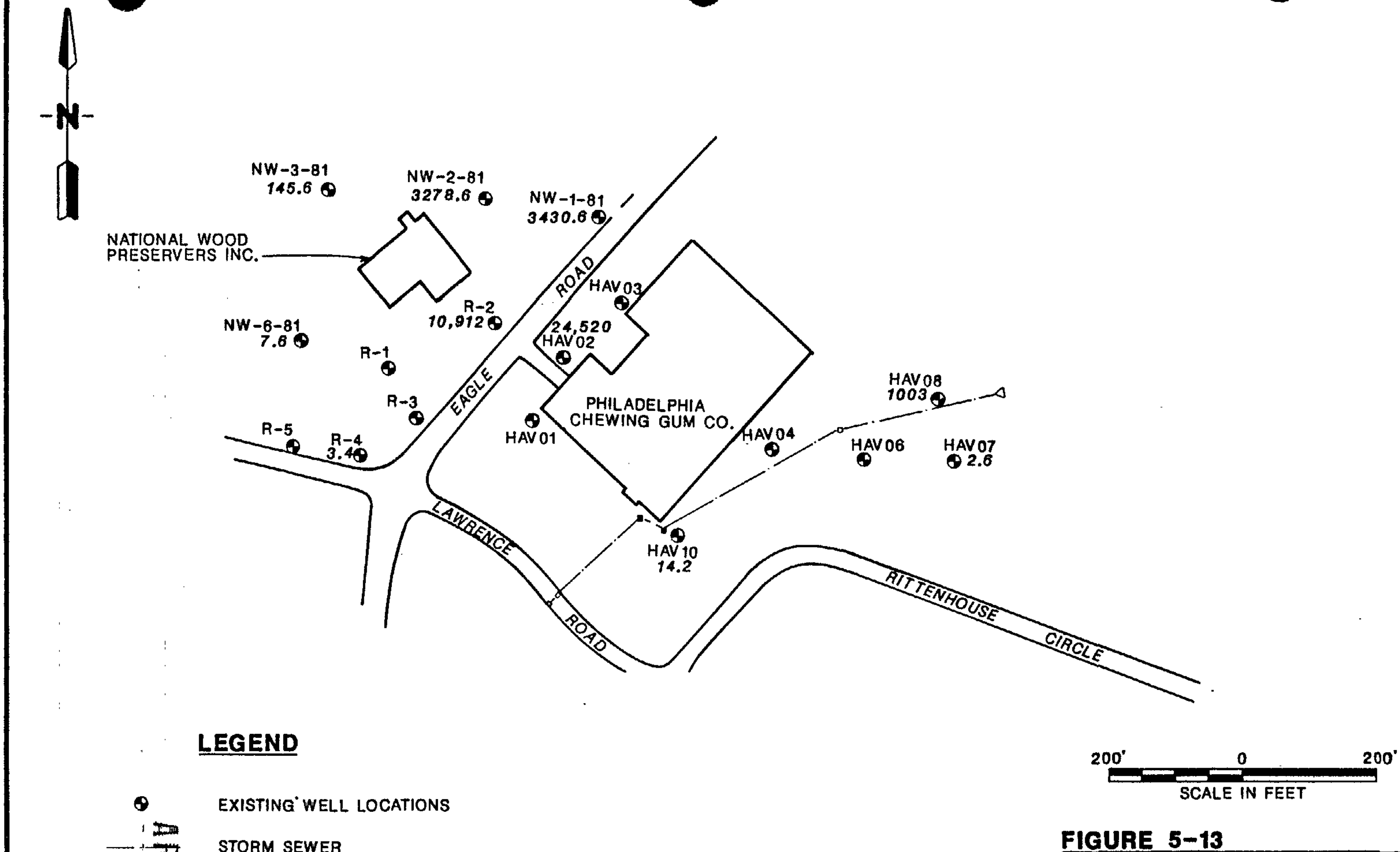



**FIGURE 5-13**

**HAVERTOWN PCP SITE**
**HAVERTOWN, PA**

TOTAL BNA'S (ug/l)
GROUNDWATER-PRELIMINARY ROUND

| | | |
|---|---|---|
| drawn CCS | approved JNW | drawing no. |
| checked JST | date 5-20-88 | 86021-031-AA |

r. e. wright associates, inc.
earth resources consultants
middletown pennsylvania

AR300252

Table 5-16

Groundwater Round 1 Pesticide/PCB and Oil and Grease and Cyanide Results

| CMPD CL CMPD-DESC | SITE<br>SAMPLE<br>DATE<br>MATRIX | 86021<br>MW-1<br>07/30/87<br>GNDWAT | 86021<br>MW-2<br>07/28/87<br>GNDWAT | 86021<br>MW-3<br>07/28/87<br>GNDWAT | 86021<br>MW-6<br>07/28/87<br>GNDWAT | 86021<br>R-2<br>07/30/87<br>GNDWAT | 86021<br>R-2(DUP)<br>07/30/87<br>GNDWAT | 86021<br>R-4<br>07/30/87<br>GNDWAT |
|---|---|---|---|---|---|---|---|---|
| | PESTICIDE/PCB LAB ID # | 143949 | 143468 | 143469 | 143470 | 144159 | 144171 | 144163 |
| 701 P ALDRIN | | BDL 0.2 ug/l | BDL 0.5 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | 5.3 ug/l | BDL 0.2 ug/l | BDL 0.05 ug/l |
| 702 P ALPHA-BHC | | BDL 0.2 ug/l | BDL 0.5 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 0.05 ug/l |
| 703 P BETA-BHC | | BDL 0.2 ug/l | BDL 0.5 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | 0.18 ug/l |
| 704 P GAMMA-BHC | | BDL 0.2 ug/l | BDL 0.5 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 0.05 ug/l |
| 705 P DELTA-BHC | | BDL 0.2 ug/l | BDL 0.5 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 0.05 ug/l |
| 706 P CHLORDANE | | BDL 2 ug/l | BDL 5 ug/l | BDL 0.05 ug/l | BDL 1 ug/l | BDL 10 ug/l | BDL 2 ug/l | BDL 0.5 ug/l |
| 707 P 4,4'-DDT | | BDL 0.4 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 2 ug/l | BDL 0.4 ug/l | BDL 0.1 ug/l |
| 708 P 4,4'-DDE | | BDL 0.4 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 2 ug/l | BDL 0.4 ug/l | BDL 0.1 ug/l |
| 709 P 4,4'-DDD | | BDL 0.4 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 2 ug/l | BDL 0.4 ug/l | BDL 0.1 ug/l |
| 710 P DIELDRIN | | BDL 0.4 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 2 ug/l | BDL 0.4 ug/l | 0.31 ug/l |
| 711 P ALPHA-ENDOSULFAN | | BDL 0.2 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 0.1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 0.05 ug/l |
| 712 P BETA-ENDOSULFAN | | BDL 0.4 ug/l | BDL 1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 2 ug/l | BDL 0.4 ug/l | BDL 0.1 ug/l |
| 713 P ENDOSULFAN SULFATE | | BDL 0.4 ug/l | BDL 1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 2 ug/l | BDL 0.4 ug/l | BDL 0.1 ug/l |
| 714 P ENDRIN | | BDL 0.4 ug/l | BDL 1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 2 ug/l | BDL 0.4 ug/l | BDL 0.1 ug/l |
| 716 P HEPTACHLOR | | BDL 0.2 ug/l | BDL 0.5 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 0.05 ug/l |
| 717 P HEPTACHLOR EPOXIDE | | BDL 0.2 ug/l | BDL 0.5 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 1 ug/l | BDL 0.2 ug/l | BDL 0.05 ug/l |
| 718 P PCB-1242 | | BDL 2 ug/l | BDL 5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 10 ug/l | BDL 2 ug/l | BDL 0.5 ug/l |
| 719 P PCB-1254 | | BDL 4 ug/l | BDL 10 ug/l | BDL 1 ug/l | BDL 2 ug/l | BDL 20 ug/l | BDL 4 ug/l | BDL 1 ug/l |
| 720 P PCB-1221 | | BDL 2 ug/l | BDL 5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 10 ug/l | BDL 2 ug/l | BDL 0.5 ug/l |
| 721 P PCB-1232 | | BDL 2 ug/l | BDL 5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 10 ug/l | BDL 2 ug/l | BDL 0.5 ug/l |
| 722 P PCB-1248 | | BDL 2 ug/l | BDL 5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 10 ug/l | BDL 2 ug/l | BDL 0.5 ug/l |
| 723 P PCB-1260 | | BDL 2 ug/l | BDL 10 ug/l | BDL 1 ug/l | BDL 2 ug/l | BDL 20 ug/l | BDL 4 ug/l | BDL 1 ug/l |
| 724 P PCB-1016 | | BDL 2 ug/l | BDL 5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 10 ug/l | BDL 2 ug/l | BDL 0.5 ug/l |
| 725 P TOXAPHENE | | BDL 4 ug/l | BDL 10 ug/l | BDL 1 ug/l | BDL 2 ug/l | BDL 20 ug/l | BDL 4 ug/l | BDL 1 ug/l |
| 726 P P,P'-METHOXYCHLOR | | BDL 2 ug/l | BDL 5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 10 ug/l | BDL 2 ug/l | BDL 0.5 ug/l |
| 730 P ENDRIN KETONE | | BDL 0.4 ug/l | BDL 1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 2 ug/l | BDL 0.4 ug/l | BDL 0.1 ug/l |
| | OIL & GREASE LAB ID # | 143950 | 143476 | 143477 | 143478 | 144145 | 144151 | 144149 |
| 1033 C OIL AND GREASE | | 21 mg/l | BDL 2 mg/l | BDL 2 mg/l | 5.1 mg/l | 310 mg/l | 220 mg/l | BDL 2 mg/l |
| 1001 C CYANIDE | | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | 14 ug/l | BDL 10 ug/l |

Table 5-16 (Cont'd)

Groundwater Round 1 Pesticide/PCB and Oil and Grease and Cyanide Results

| CMPD | CL | CMPD-DESC | | | | |
|---|---|---|---|---|---|---|
| | | SITE | 86021 | 86021 | 86021 | 86021 |
| | | SAMPLE | HAV-2 | HAV-7 | HAV-8 | HAV-10 |
| | | DATE | 07/30/87 | 08/01/87 | 08/01/87 | 08/01/87 |
| | | MATRIX | GNDWAT | GNDWAT | GNDWAT | GNDWAT |
| | | PESTICIDE/PCB LAB ID # | 144160 | 144132 | 144140 | 144158 |
| | | ===================== | ====== | ====== | ====== | ====== |
| 701 | P | ALDRIN | BDL 1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 702 | P | ALPHA-BHC | BDL 1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 703 | P | BETA-BHC | 18 ug/l | BDL 0.05 ug/l | 0.59 ug/l | 0.1 ug/l |
| 704 | P | GAMMA-BHC | BDL 1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 705 | P | DELTA-BHC | BDL 1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 706 | P | CHLORDANE | BDL 10 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 707 | P | 4,4'-DDT | BDL 2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 708 | P | 4,4'-DDE | BDL 2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 709 | P | 4,4'-DDD | BDL 2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 710 | P | DIELDRIN | BDL 2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 711 | P | ALPHA-ENDOSULFAN | BDL 1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 712 | P | BETA-ENDOSULFAN | BDL 2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 713 | P | ENDOSULFAN SULFATE | BDL 2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 714 | P | ENDRIN | BDL 2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 716 | P | HEPTACHLOR | BDL 1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 717 | P | HEPTACHLOR EPOXIDE | BDL 1 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.05 ug/l |
| 718 | P | PCB-1242 | BDL 10 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 0.5 ug/l |
| 719 | P | PCB-1254 | BDL 20 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l |
| 720 | P | PCB-1221 | BDL 10 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 721 | P | PCB-1232 | BDL 10 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 722 | P | PCB-1248 | BDL 10 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 0.5 ug/l |
| 723 | P | PCB-1260 | BDL 20 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l |
| 724 | P | PCB-1016 | BDL 10 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 0.5 ug/l |
| 725 | P | TOXAPHENE | BDL 20 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l |
| 726 | P | P,P'-METHOXYCHLOR | BDL 10 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 0.5 ug/l |
| 739 | P | ENDRIN KETONE | BDL 2 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l |
| | | OIL & GREASE LAB ID # | 144147 | 144131 | 144133 | 144143 |
| | | ===================== | ====== | ====== | ====== | ====== |
| 1033 | C | OIL AND GREASE | 290 mg/l | BDL 2 | 2.2 mg/l | BDL 2 mg/l |
| 1001 | C | CYANIDE | BDL 10 ug/l | BDL 10 ug/l | BROKEN BY CCL | BDL 10 ug/l |

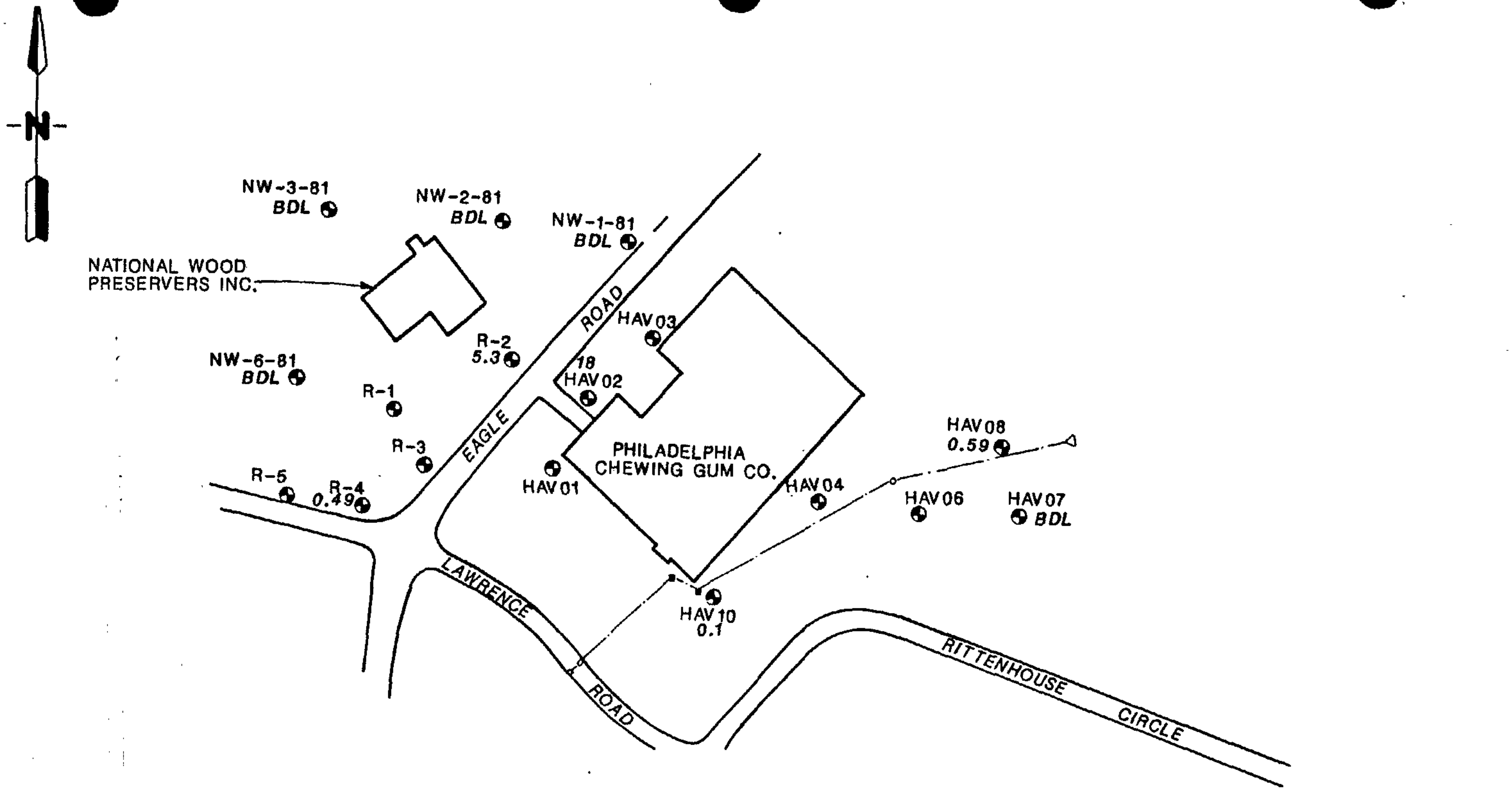
than other wells. Figure 5-14 depicts the total pesticide concentration in the 10 selected monitoring wells during the preliminary sampling round. A contour map was not produced for reasons stated previously.

5.3.5.1.5 Cyanide and Oil and Grease - Cyanide and oil and grease analyses were performed on groundwater samples from the preliminary sampling round. The results of the cyanide analysis are also provided in Table 5-16. The cyanide levels were below the 10 ug/l detection limit in all of the samples except for the duplicate sample taken at well R-2. At R-2, the duplicate sample contained cyanide at a concentration of 14 ug/l. It is uncertain why this occurred.

The oil and grease results are also presented in Table 5-16. A plot of the results is shown on Figure 5-15. Of the five samples in which oil & grease were detected, concentrations are again highest in groundwater between NWP and PCG. Owing to the limited data and the reasons previously mentioned, the data for cyanide and oil and grease were not contoured.

5.3.5.1.6 Dioxins and Dibenzofurans - Groundwater samples from nine existing monitoring wells and one oil sample from R-2 were analyzed for dioxin and chlorinated dibenzofuran isomers by California Analytical Lab, under the direction of the EPA. Two groundwater samples, HAV-07 and NW-1-81, were broken in transit to the analytical lab and could not be analyzed.

The primary isomers of dioxin found in groundwater samples were octa-, hepta-, and some hexa-, chlorinated dibenzo-p-dioxin. Only one well, NW-2-81, had the tetra-dioxin group identified at a concentration of 0.11 parts per trillion (ppt). The 2,3,7,8




## LEGEND

EXISTING WELL LOCATIONS

STORM SEWER

BDL BELOW DETECTION LIMIT

**FIGURE 5-14**

| |
|---|
| **HAVERTOWN PCP SITE** HAVERTOWN, PA |
| TOTAL PESTICIDES (ug/l) |
| GROUNDWATER-PRELIMINARY ROUND |

| drawn | approved | drawing no. |
|---|---|---|
| CCS | JNW | |
| checked JST | date 5-20-88 | 86021-030-AA |

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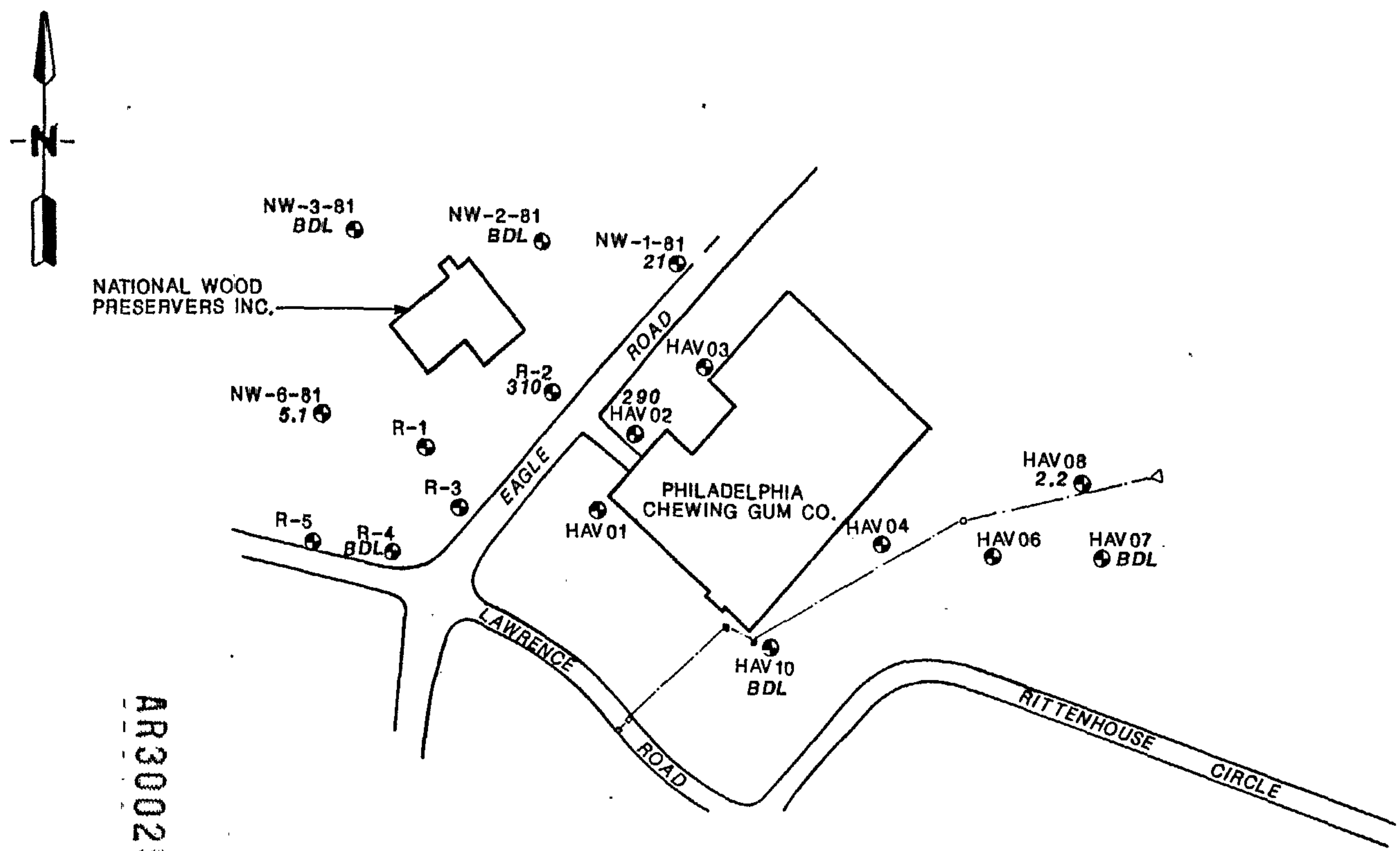


## LEGEND

- EXISTING WELL LOCATIONS
- STORM SEWER
- BDL — BELOW DETECTION LIMIT

**FIGURE 5-15**

**HAVERTOWN PCP SITE**
**HAVERTOWN, PA**

OIL AND GREASE (mg/l)
GROUNDWATER-PRELIMINARY ROUND

| | | |
|---|---|---|
| drawn CCS | approved JHU | drawing no. 86021-029-AA |
| checked JST | date 5-20-88 | |

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isomer was below the detection limit at this site. It was observed from the results of this analysis, Table 5-17, that wells with oil in them contained greater amounts of the hexa-dioxin isomers, well HAV-02 in particular. Further comparison of the results from HAV-02 and that of the oil sample indicate that it is likely that the groundwater sample taken at HAV-02 contained substantial amounts of emulsified oil. It is believed that the groundwater sample at HAV-02 contained suspended amounts of oil because the sampling method was bailing. To ensure that this would not recur in the following sampling round (round #2), a more uniform and consistent sampling procedure was employed using peristaltic pumps and Well Wizards.

The total concentrations of dioxin isomers were plotted on Figure 5-16. Eliminating the value at HAV-02 because of oil contamination in the sample, the highest dioxin concentration was found at well R-2 (1844.94 ppt). Well NW-2-81 also contained a substantially higher amount of total dioxin isomers (696.71 ppt) than other sampled wells. Because of the variety of sampling methods which were necessary during the preliminary sampling round, some variation in analytical results is anticipated. However, no quantification of this variance is possible.

The majority of the dibenzofuran isomers were identified in the groundwater samples taken during the preliminary sampling round. No sample results were obtained again on wells HAV-07 and NW-1-81 because the bottles were broken in transit. Table 5-18 contains the results of this analysis. Wells with oil in them, R-2 and HAV-02, contained the greatest amounts of dibenzofurans. NW-2-81 also had relatively high values; however, no product was observed

Table 5-17

Groundwater Round 1 Dioxin Results

| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
|---|---|---|---|---|---|---|---|
| POINT: | HAV-2 | HAV-7 | HAV-8 | MW-1 | MW-2 | MW-3 | MW-6 |
| LAB ID #: | 30648-3RX | | 30648-1RI | | 30648-12 | 30648-9 | 30648-10 |
| GC/MS DATE: | 8-26-87 | BROKEN IN TRANSIT | 8-19-87 | BROKEN IN TRANSIT | 8-20-87 | 8-19-87 | 8-19-87 |
| MATRIX: | WA | | WA | | WA | WA | WA |
| TCDD | BDL 1.2 ppt | | BDL 0.081 ppt | | 0.11 ppt | BDL 0.04 ppt | BDL 0.031 ppt |
| 2378 TCDD | BDL 1.6 ppt | | BDL 0.081 ppt | | BDL 0.048 ppt | BDL 0.04 ppt | BDL 0.031 ppt |
| PnCDD | BDL 1.9 ppt | | BDL 0.26 ppt | | BDL 0.17 ppt | BDL 0.091 ppt | BDL 0.13 ppt |
| 12378 PnCDD | BDL 4.0 ppt | | | | BDL 0.16 ppt | | |
| HxCDD | 250 ppt | | BDL 0.17 ppt | | BDL 6.4 ppt | BDL 0.10 ppt | BDL 0.13 ppt |
| 123478 HxCDD | BDL 8.4 ppt | | | | BDL 0.47 ppt | | |
| 123678 HxCDD | 178 ppt | | | | 3.6 ppt | | |
| 123789 HxCDD | BDL * 14 ppt | | | | BDL *0.38 ppt | | |
| HpCDD | 3520 ppt | | BDL 0.59 ppt | | 76 ppt | BDL 0.33 ppt | 4.2 ppt |
| 1234678 HpCDD | 5870 ppt | | | | 108 ppt | | |
| OCDD | 27700 ppt | | BDL 2.5 ppt | | 509 ppt | BDL 2.2 ppt | 16 ppt |

( * NPC )

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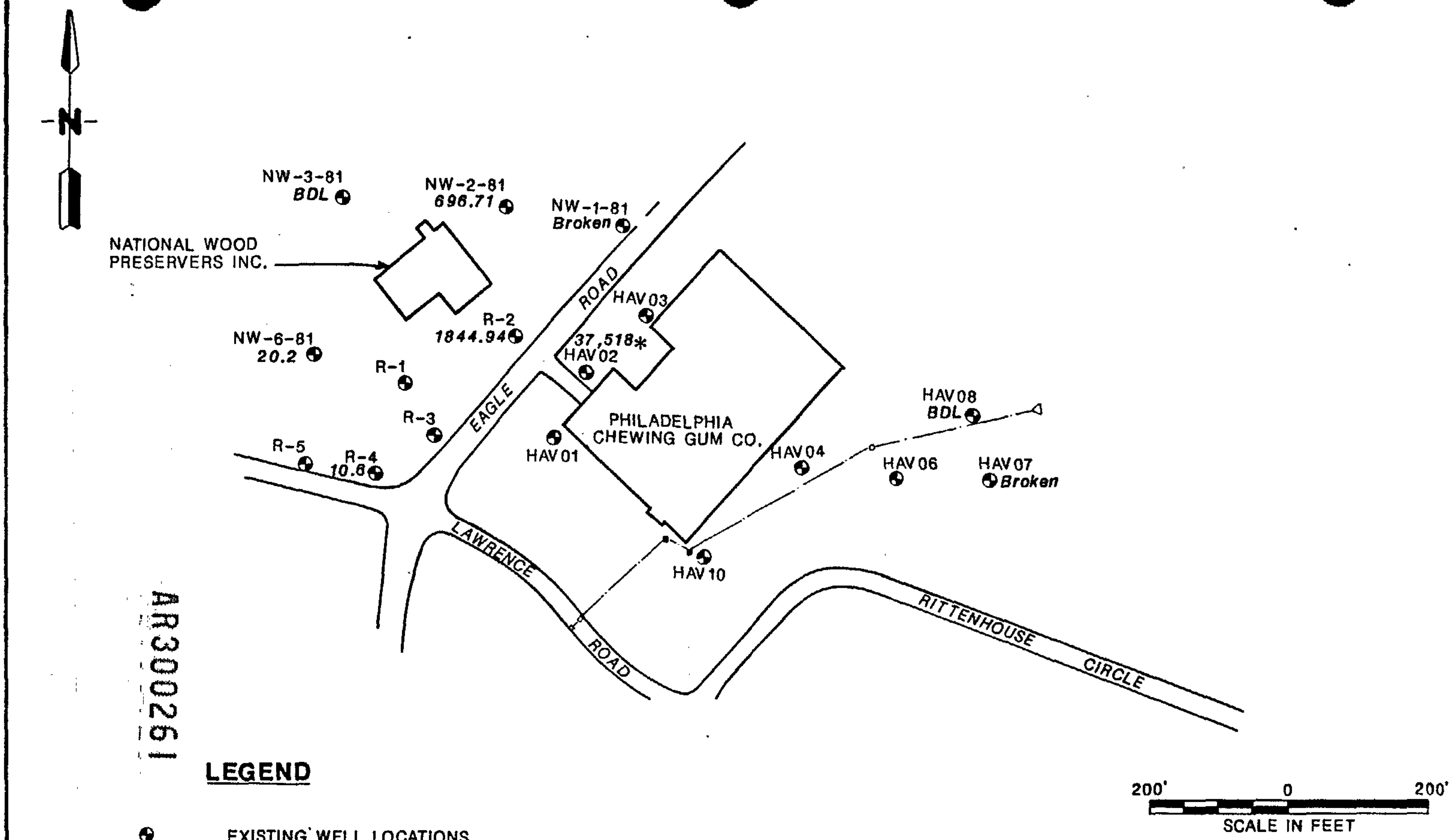
Table 5-17 (Cont'd)

Groundwater Round 1 Dioxin Results

| | | | | |
|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 |
| POINT: | R-2 | R-2(DUP) | R-2 | R-4 |
| LAB ID #: | 30648-2RX | 30648-13 | 30648-14 | 30648-11 |
| GC/MS DATE: | 8-25-87 | 8-20-87 | 8-20-87 | 8-20-87 |
| MATRIX: | PRODUCT | WA | WA | WA |
| TCDD | BDL 1.6 ppt | BDL 0.079 ppt | BDL 0.051 ppt | BDL 0.029 ppt |
| 2378 TCDD | BDL 2.6 ppt | BDL 0.16 ppt | BDL 0.069 ppt | BDL 0.029 ppt |
| PnCDD | BDL 3.9 ppt | BDL 0.18 ppt | BDL 0.18 ppt | BDL 0.092 ppt |
| 12378 PnCDD | BDL 7.5 ppt | BDL 0.59 ppt | BDL 0.18 ppt | |
| HxCDD | 280 ppt | 15.5 ppt | 11 ppt | BDL 0.10 ppt |
| 123478 HxCDD | BDL 14.9 ppt | BDL 1.5 ppt | BDL 0.32 ppt | |
| 123678 HxCDD | 199 ppt | 9.3 ppt | 7.4 ppt | |
| 123789 HxCDD | BDL 21.4 ppt | BDL 1.2 ppt | 0.54 ppt | |
| HpCDD | 4290 ppt | 227 ppt | 147 ppt | 2.0 ppt |
| 1234678 HpCDD | 7110 ppt | 335 ppt | 239 ppt | |
| OCDD | 37900 ppt | 2020 ppt | 1440 ppt | 8.6 ppt |

( * MPC )

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**LEGEND**

| | |
|---|---|
| ⊕ | EXISTING WELL LOCATIONS |
| —·— | STORM SEWER |
| *BDL* | BELOW DETECTION LIMIT |
| * | BIASED (HIGH) NUMBER DUE TO SAMPLE CONTAMINATION WITH OIL |

**FIGURE 5-16**

**HAVERTOWN PCP SITE**
HAVERTOWN, PA

TOTAL DIOXIN ISOMERS (ppt)
GROUNDWATER-PRELIMARY ROUND

drawn CCS | approved JNW | drawing no. 86021-024-AA
checked JST | date 5-20-88

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Table 5-18

Groundwater Round 1 Dibenzofuran Results

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | HAV-2 | HAV-7 | HAV-8 | MW-1 | MW-2 | MW-3 | MW-6 |
| LAB ID #: | 30648-3RX | | 30648-1R1 | | 30648-12 | 30648-9 | 30648-10 |
| GC/MS DATE: | 8-26-87 | BROKEN IN TRANSIT | 8-19-87 | BROKEN IN TRANSIT | 8-20-87 | 8-19-88 | 8-19-87 |
| MATIRX: | WA | | WA | | WA | WA | WA |
| CDP NAME | | | | | | | |
| TCDF | BDL 0.9 ppt | | BDL 0.032 ppt | | 0.11 ppt | BDL 0.039 ppt | BDL 0.028 ppt |
| 2378 TCDF | BDL 1.2 ppt | | BDL 0.032 ppt | | BDL 0.048 ppt | BDL 0.039 ppt | BDL 0.028 ppt |
| PnCDF | 18.8 ppt | | BDL 0.40 ppt | | 0.16 ppt | BDL 0.76 ppt | BDL 0.11 ppt |
| 12378 PnCDF | 4.0 ppt | | | | BDL 0.084 ppt | | |
| 23478 PnCDF | BDL 3.1 ppt | | | | BDL 0.089 ppt | | |
| HxCDF | 1290 ppt | | BDL 0.12 ppt | | 35.3 ppt | BDL 0.063 ppt | 0.049 ppt |
| 123478 HxCDF | 28.2 ppt | | | | 0.042 ppt | | |
| 123678 HxCDF | BDL 6.5 ppt | | | | BDL 0.09 ppt | | |
| 123789 HxCDF | 7.3 ppt | | | | 0.16 ppt | | |
| 234678 HxCDF | BDL 12.4 ppt | | | | BDL 0.25 ppt | | |
| HpCDF | 8516 ppt | | BDL 0.59 ppt | | 228 ppt | BDL *0.42 ppt | 3.7 ppt |
| 1234678 HpCDF | 1620 ppt | | | | 50 ppt | | |
| 1234789 HpCDF | 64.2 ppt | | | | 1.5 ppt | | |
| OCDF | 16100 ppt | | BDL 0.75 ppt | | 350 ppt | BDL 0.54 ppt | 5.2 ppt |

( * MPC )

Table 5-18 (Cont'd)

Groundwater Round 1 Dibenzofuran Results

| | | | | |
|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 |
| POINT: | R-2 | R-2(DUP) | R-2 | R-4 |
| LAB ID #: | 30648-2RX | 30648-13 | 30648-13 | 30648-11 |
| GC/MS DATE: | 8-25-87 | 8-20-87 | 8-20-87 | 8-20-87 |
| MATRIX: | PRODUCT | WA | WA | WA |
| CMP NAME | | | | |
| TCDF | BDL 2.2 ppt | BDL 0.099 ppt | BDL 0.034 ppt | BDL 0.022 ppt |
| 2378 TCDF | BDL 4.4 ppt | BDL 0.15 ppt | BDL 0.069 ppt | BDL 0.022 ppt |
| PnCDF | 22.5 ppt | 0.96 ppt | 1.1 ppt | BDL 0.075 ppt |
| 12378 PnCDF | BDL 6 ppt | BDL 0.31 ppt | 0.14 ppt | |
| 23478 PnCDF | BDL 4.5 ppt | BDL 0.42 ppt | BDL 0.13 ppt | |
| HxCDF | 1424 ppt | 82.2 ppt | 52.3 ppt | BDL 0.18 ppt |
| 123478 HxCDF | 35.1 ppt | BDL *1.8 ppt | 1.3 ppt | |
| 123678 HxCDF | BDL 14 ppt | BDL 0.65 ppt | BDL 0.39 ppt | |
| 123789 HxCDF | 10.2 ppt | 0.47 ppt | 0.37 ppt | |
| 234678 HxCDF | BDL 24.2 ppt | 4.3 ppt | BDL 0.4 ppt | |
| HpCDF | 9461 ppt | 518 ppt | 346 ppt | 1.5 ppt |
| 1234678 HpCDF | 18600 ppt | 96 ppt | 63.4 ppt | |
| 1234789 HpCDF | 79.3 ppt | 3.7 ppt | 2.8 ppt | |
| OCDF | 17100 ppt | 892 ppt | 662 ppt | 3.1 ppt |

( * MPC )

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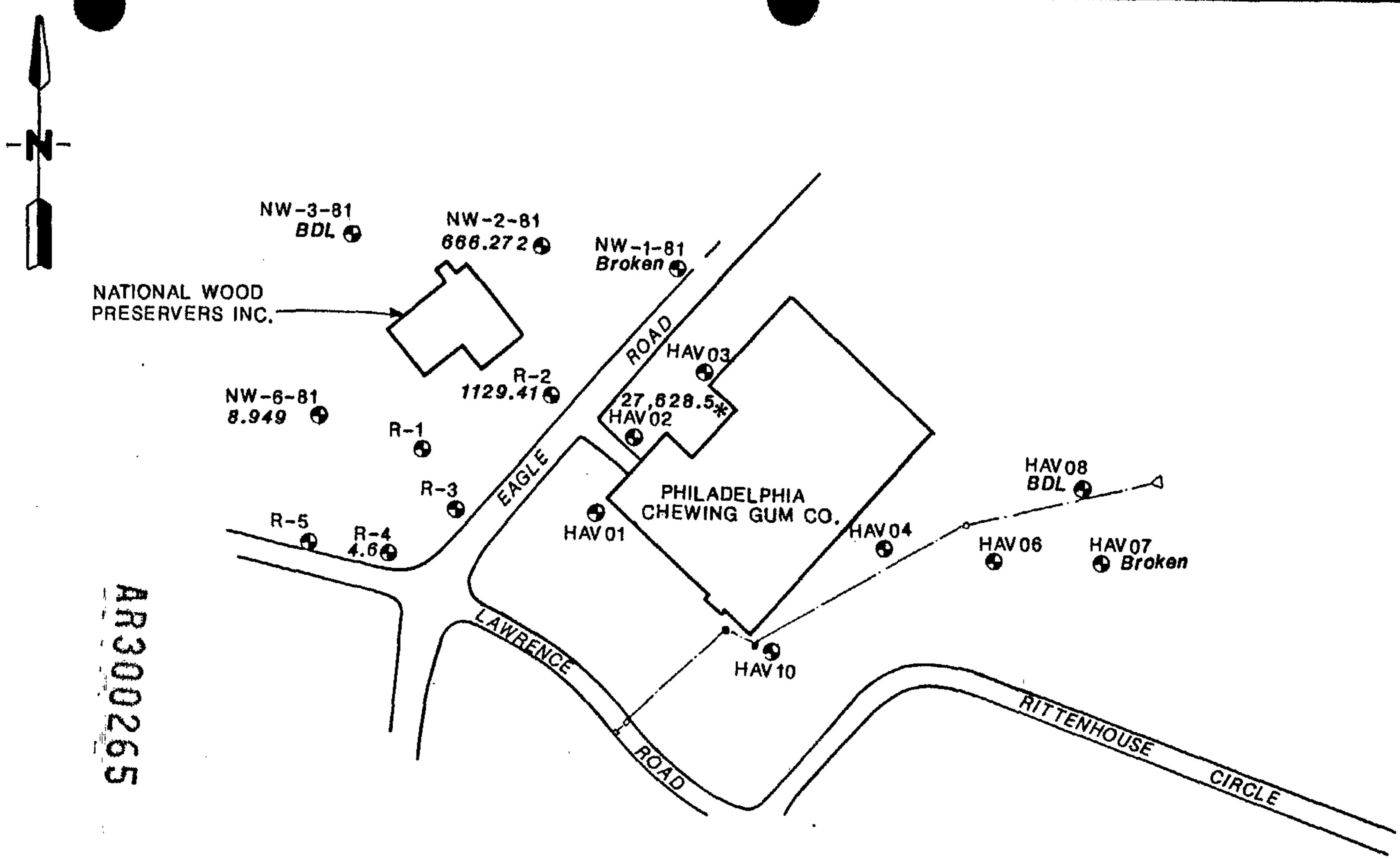
in this well. Well NW-2-81 was also the only well in which the tetrafuran group was identified, at a concentration of 0.11 ppt.

Figure 5-17 depicts the total dibenzofuran results. Eliminating the results of HAV-02, the total dibenzofurans were highest at well R-2. The results of well HAV-02 were ignored because it is believed that the sampling method introduced oil into the sample. Like the previously mentioned total dioxin concentrations, well NW-2-81 also contained a relatively high value for total dibenzofurans.

5.3.5.2 Sampling Round #2

5.3.5.2.1 Metals - Groundwater samples from 10 selected existing and 18 newly installed monitoring wells were analyzed for dissolved metals. The results of this analysis, shown on Table 5-19, indicate that groundwater contains relatively high dissolved concentrations of calcium, sodium, magnesium, iron, manganese, and potassium. Lower concentrations of arsenic, cadmium, chromium, copper, lead, and zinc were also found.

The most frequently identified dissolved metal of interest was zinc, with reported values ranging from 8.1 ug/l (CW-1S) to 253 ug/l (R-2). Chromium was reported in two wells, NW-3-81 and HAV-02, at concentrations of 124 ug/l and 6.3 ug/l respectively. Cadmium was found in two wells, CW-3I and CW-6I, at a level of 5.6 ug/l in each well. Copper was not found above the detection limits. Arsenic was identified in nine monitoring wells, ranging in concentration from 2.2 ug/l to 23 ug/l. Lead was present in three wells, CW-5I, CW-5D, and HAV-05, at concentrations of 5.7, 8.5 and 3.3 ug/l respectively. Other dissolved metals were also






## LEGEND

| | |
|---|---|
| ⊕ | EXISTING WELL LOCATIONS |
| —·— | STORM SEWER |
| * | BIASED (HIGH) NUMBER DUE TO SAMPLE CONTAMINATE WITH OIL |
| *BDL* | BELOW DETECTION LIMIT |

200' 0 200'
SCALE IN FEET

**FIGURE 5-17**

**HAVERTOWN PCP SITE**
**HAVERTOWN, PA**

TOTAL DIBENZOFURAN ISOMERS(ppt)
GROUNDWATER-PRELIMINARY ROUND

| | | |
|---|---|---|
| drawn CCS | approved JNW | drawing no. |
| checked JST | date 5-20-88 | 86021-027-AA |

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middletown pennsylvania

Table 5-19

Ground Water Round 2 Metals Results

| CMPD | SITE | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE | CW-1-D | | CW-1-I | | CW-1-S | | CW-2-D | | CW-2-D-DUP | | CW-2-I | | CW-2-S | |
| | DATE | 03/14/88 | | 03/14/88 | | 03/14/88 | | 03/14/88 | | 03/14/88 | | 03/14/88 | | 03/14/88 | |
| | MATRIX | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | |
| | METALS LAB I. D. # | 185198 | | 185195 | | 185190 | | 185199 | | 185200 | | 185191 | | 185135 | |
| 101 M | ANTIMONY | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L |
| 102 M | ARSENIC | BDL | 1.5 UG/L | BDL | 1.5 UG/L | BDL | 1.5 UG/L | BDL | 1.5 UG/L | BDL | 1.5 UG/L | BDL | 1.5 UG/L | BDL | 1.5 UG/L |
| 103 M | BERYLLIUM | BDL | 1 UG/L | 1.6 | []P UG/L | 1.9 | []P UG/L | BDL | 1 UG/L | BDL | 1 UG/L | 1.9 | []P UG/L | BDL | 1 UG/L |
| 104 M | CADMIUM | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L |
| 105 M | CHROMIUM | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L |
| 106 M | COPPER | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L |
| 107 M | LEAD | BDL | 2.5 UG/L | BDL | 2.5 UG/L | BDL | 2.5 UG/L | BDL | 2.5 UG/L | BDL | 2.5 UG/L | BDL | 2.5 UG/L | BDL | 2.5 UG/L |
| 108 M | MERCURY | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L |
| 109 M | NICKEL | BDL | 39 UG/L | BDL | 39 UG/L | BDL | 39 UG/L | BDL | 39 UG/L | BDL | 39 UG/L | BDL | 39 UG/L | BDL | 39 UG/L |
| 110 M | SELENIUM | BDL | 1.3 UG/L | BDL | 1.3 UG/L | BDL | 1.3 UG/L | BDL | 1.3 UG/L | BDL | 1.3 UG/L | BDL | 1.3 UG/L | 2.5 | []F MUG/L |
| 111 M | SILVER | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L |
| 112 M | THALLIUM | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L |
| 113 M | ZINC | 8.1 | []P UG/L | 16 | []P UG/L | 33 | P UG/L | 53 | P UG/L | 50 | P UG/L | 219 | P UG/L | 77 | P UG/L |
| 114 M | BARIUM | 63 | []P UG/L | 29 | []P UG/L | 29 | []P UG/L | 24 | []P UG/L | 26 | []P UG/L | 33 | []P UG/L | 65 | []P EUG/L |
| 115 M | IRON | 96500 | P UG/L | 61300 | P UG/L | 20600 | P UG/L | 1090 | P UG/L | 1140 | P UG/L | 353 | P UG/L | 111 | P UG/L |
| 116 M | MANGANESE | 10300 | P UG/L | 14700 | P UG/L | 13200 | P UG/L | 9860 | P UG/L | 10200 | P UG/L | 7120 | P UG/L | 7550 | P UG/L |
| 117 M | VANADIUM | BDL | 3 UG/L | BDL | 3 UG/L | BDL | 3 UG/L | BDL | 3 UG/L | BDL | 3 UG/L | BDL | 3 UG/L | 4.7 | []P UG/L |
| 118 M | ALUMINUM | BDL | 43 UG/L | BDL | 43 UG/L | 51 | []P UG/L | BDL | 43 UG/L | BDL | 43 UG/L | 144 | []P UG/L | 48 | []P UG/L |
| 120 M | COBALT | BDL | 5 UG/L | 171 | P UG/L | 362 | P UG/L | 413 | P UG/L | 424 | P UG/L | 241 | P UG/L | 210 | P UG/L |
| 121 M | MAGNESIUM | 20500 | P UG/L | 25600 | P UG/L | 28700 | P UG/L | 17200 | P UG/L | 17400 | P UG/L | 11400 | P UG/L | 12500 | P E UG/L |
| 129 M | Calcium | 44800 | P UG/L | 81600 | P UG/L | 99300 | P UG/L | 43900 | P UG/L | 45200 | P UG/L | 28400 | P UG/L | 33500 | P E UG/L |
| 130 M | Sodium | 51200 | P UG/L | 57900 | P UG/L | 39000 | P UG/L | 20100 | P UG/L | 19700 | P UG/L | 15900 | P UG/L | 13300 | P E UG/L |
| 131 M | Potassium | 4620 | []P UG/L | 6160 | P UG/L | 4120 | []P UG/L | BDL | 2400 UG/L | BDL | 2400 UG/L | BDL | 2400 UG/L | 4150 | []P UG/L |

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Table 5-19 (Cont'd)

Ground Water Round 2 Metals Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 86021 CW-3-D 03/09/88 GNDWAT | | 86021 CW-3-I 03/09/88 GNDWAT | | 86021 CW-3-S 03/09/88 GNDWAT | | 86021 CW-4-D 03/08/88 GNDWAT | | 86021 CW-4-I 03/08/88 GNDWAT | | 86021 CW-4-S 03/08/88 GNDWAT | | 86021 CW-5-D 03/08/88 GNDWAT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | METALS LAB I. D. # | 184224 | | 184226 | | 184225 | | 184008 | | 184001 | | 183999 | | 184009 | |
| 101 M | ANTIMONY | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L | BDL | 53 UG/L |
| 102 M | ARSENIC | BDL | 1.5 UG/L | BDL | 1.5 UG/L | BDL | 1.5 UG/L | 23 | F S UG/L | 2.6 | []F UG/L | 3.5 | []F UG/L | 3 | []F UG/L |
| 103 M | BERYLLIUM | BDL | 1 UG/L | BDL | 1 UG/L | BDL | 1 UG/L | BDL | 1 UG/L | BDL | 1 UG/L | BDL | 1 UG/L | BDL | 1 UG/L |
| 104 M | CADMIUM | BDL | 5 UG/L | 5.6 | P UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L |
| 105 M | CHROMIUM | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L | BDL | 5 UG/L |
| 106 M | COPPER | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L | BDL | 20 UG/L |
| 107 M | LEAD | BDL | 2.5 UG/L | BDL | 2.5 UG/L | BDL | 2.5 UG/L | BDL | 2.5 UG/L | BDL | 2.5 UG/L | BDL | 2.5 UG/L | 8.5 | F N UG/L |
| 108 M | MERCURY | 0.39 | CV UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L |
| 109 M | NICKEL | 47 | P UG/L | BDL | 39 UG/L | BDL | 39 UG/L | BDL | 39 UG/L | BDL | 39 UG/L | BDL | 39 UG/L | BDL | 39 UG/L |
| 110 M | SELENIUM | 18 | []F MUG/L | BDL | 1.3 UG/L | BDL | 1.3 UG/L | BDL | 6.5 UG/L | BDL | 6.5 UG/L | BDL | 6.5 UG/L | BDL | 1.3 UG/L |
| 111 M | SILVER | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L | BDL | 8 UG/L |
| 112 M | THALLIUM | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L | BDL | 2.2 UG/L |
| 113 M | ZINC | 35 | P UG/L | 32 | P UG/L | 27 | P UG/L | 44 | P UG/L | 12 | []P UG/L | 12 | []P UG/L | 18 | []P UG/L |
| 114 M | BARIUM | 93 | []P EUG/L | 137 | []P EUG/L | 130 | []P EUG/L | 41 | []P UG/L | 93 | []P UG/L | 75 | []P UG/L | 131 | []P UG/L |
| 115 M | IRON | 2380 | P UG/L | 12700 | P UG/L | 14900 | P UG/L | 11700 | P UG/L | 1160 | P UG/L | 25 | []P UG/L | 35900 | P UG/L |
| 116 M | MANGANESE | 6370 | P UG/L | 13600 | P UG/L | 11800 | P UG/L | 10900 | P UG/L | 4890 | P UG/L | 5620 | P UG/L | 11500 | P UG/L |
| 117 M | VANADIUM | 4.3 | []P UG/L | 6 | []P UG/L | 3.6 | []P UG/L | 4.7 | []P UG/L | BDL | 3 UG/L | BDL | 3 UG/L | 6.5 | []P UG/L |
| 118 M | ALUMINUM | BDL | 43 UG/L | BDL | 43 UG/L | BDL | 43 UG/L | BDL | 43 UG/L | BDL | 43 UG/L | BDL | 43 UG/L | BDL | 43 UG/L |
| 120 M | COBALT | 44 | []P UG/L | 72 | P UG/L | 56 | P UG/L | 67 | P UG/L | 35 | []P UG/L | 13 | []P UG/L | 26 | []P UG/L |
| 121 M | MAGNESIUM | 16400 | P E UG/L | 12900 | P E UG/L | 11800 | P E UG/L | 16900 | P UG/L | 15300 | P UG/L | 15800 | P UG/L | 14400 | P UG/L |
| 129 M | Calcium | 36300 | P E UG/L | 35000 | P E UG/L | 31800 | P E UG/L | 29000 | P UG/L | 63500 | P UG/L | 33300 | P UG/L | 23100 | P UG/L |
| 130 M | Sodium | 30600 | P E UG/L | 38000 | P E UG/L | 33100 | P E UG/L | 33300 | P E UG/L | 39800 | P E UG/L | 29100 | P E UG/L | 22300 | P E UG/L |
| 131 M | Potassium | 6710 | P UG/L | 4800 | []P UG/L | 4940 | []P UG/L | 4790 | []P UG/L | 7110 | P UG/L | 4400 | []P UG/L | 2790 | []P UG/L |

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Table 5-19 (Cont'd)

Ground Water Round 2 Metals Results

| CMPD | SITE<br>SAMPLE<br>DATE<br>MATRIX | 86021<br>CW-5-I<br>03/08/88<br>GNDWAT | 86021<br>CW-5-S<br>03/08/88<br>GNDWAT | 86021<br>CW-6-D<br>03/09/88<br>GNDWAT | 86021<br>CW-6-I<br>03/10/88<br>GNDWAT | 86021<br>CW-6-S<br>03/10/88<br>GNDWAT | 86021<br>MAV-2<br>03/09/88<br>GNDWAT | 86021<br>MAV-5<br>03/09/88<br>GNDWAT |
|---|---|---|---|---|---|---|---|---|
| | METALS LAB I. D. # | 184003 | 184000 | 184223 | 184702 | 184703 | 184227 | 184228 |
| | ================== | ====== | ====== | ====== | ====== | ====== | ====== | ====== |
| 101 M ANTIMONY | | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L |
| 102 M ARSENIC | | 2.2 []F UG/L | 14 F S UG/L | BDL 1.5 UG/L | BDL 1.5 UG/L | BDL 1.5 UG/L | 3.1 []F UG/L | BDL 1.5 UG/L |
| 103 M BERYLLIUM | | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L |
| 104 M CADMIUM | | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | 5.6 P UG/L | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L |
| 105 M CHROMIUM | | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | 6.3 []P UG/L | BDL 5 UG/L |
| 106 M COPPER | | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L |
| 107 M LEAD | | 5.7 F M UG/L | BDL 2.5 UG/L | BDL 2.5 UG/L | BDL 2.5 UG/L | BDL 2.5 UG/L | BDL 2.5 UG/L | 3.3 []F MUG/L |
| 108 M MERCURY | | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L |
| 109 M NICKEL | | BDL 39 UG/L | BDL 39 UG/L | 41 P UG/L | BDL 39 UG/L | BDL 39 UG/L | 55 P UG/L | BDL 39 UG/L |
| 110 M SELENIUM | | BDL 1.3 UG/L | BDL 1.3 UG/L | 25 []F MUG/L | BDL 1.3 UG/L | BDL 1.3 UG/L | BDL 1.3 UG/L | 13 []F MUG/L |
| 111 M SILVER | | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L |
| 112 M THALLIUM | | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L |
| 113 M ZINC | | 8.4 []P UG/L | 15 []P UG/L | 52 P UG/L | 87 P UG/L | 18 []P UG/L | 67 P UG/L | 49 P UG/L |
| 114 M BARIUM | | 129 []P UG/L | 80 []P UG/L | 77 []P EUG/L | 113 []P EUG/L | 225 P E UG/L | 37 []P EUG/L | 86 []P EUG/L |
| 115 M IRON | | 33400 P UG/L | 16800 P UG/L | 5810 P UG/L | 890 P UG/L | 7910 P UG/L | 7650 P UG/L | 24200 P UG/L |
| 116 M MANGANESE | | 11800 P UG/L | 9180 P UG/L | 4860 P UG/L | 7090 P UG/L | 4320 P UG/L | 19700 P UG/L | 13000 P UG/L |
| 117 M VANADIUM | | 7.5 []P UG/L | 5.7 []P UG/L | 6.6 []P UG/L | 5.8 []P UG/L | 7.1 []P UG/L | 7.2 []P UG/L | BDL 3 UG/L |
| 118 M ALUMINUM | | 47 []P UG/L | 89 []P UG/L | BDL 43 UG/L | BDL 43 UG/L | BDL 43 UG/L | BDL 43 UG/L | BDL 43 UG/L |
| 120 M COBALT | | 17 []P UG/L | 21 []P UG/L | 29 []P UG/L | 36 []P UG/L | 20 []P UG/L | 131 P UG/L | 54 P UG/L |
| 121 M MAGNESIUM | | 13600 P UG/L | 12400 P UG/L | 23300 P E UG/L | 25200 P E UG/L | 58200 P E UG/L | 25300 P E UG/L | 11400 P E UG/L |
| 129 M Calcium | | 23400 P UG/L | 33300 P UG/L | 62200 P E UG/L | 70400 P E UG/L | 95000 P E UG/L | 41800 P E UG/L | 19700 P E UG/L |
| 130 M Sodium | | 20200 P E UG/L | 15600 P E UG/L | 41800 P E UG/L | 38300 P E UG/L | 95500 P E UG/L | 53100 P E UG/L | 14900 P E UG/L |
| 131 M Potassium | | 3120 []P UG/L | 8230 P UG/L | 8090 P UG/L | 7630 P UG/L | 12100 P UG/L | 9060 P UG/L | 6030 P UG/L |

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Table 5-19 (Cont'd)

Ground Water Round 2 Metals Results

| CMPD | SITE | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
|---|---|---|---|---|---|---|---|---|
| | SAMPLE | HAV-7 | HAV-8 | MW-1-81 | MW-1-81 DUP | MW-2-81 | MW-3-81 | MW-6-81 |
| | DATE | 03/08/88 | 03/08/88 | 03/10/88 | 03/10/88 | 03/15/88 | 03/15/88 | 03/15/88 |
| | MATRIX | GNDWAT | GNDWAT | GNDWAT | GNDWAT | GNDWAT | GNDWAT | GNDWAT |
| | METALS LAB I. D. # | 184010 | 184012 | 184704 | 184705 | 185389 | 185390 | 185391 |
| | ================= | ====== | ====== | ====== | ====== | ====== | ====== | ====== |
| 101 M ANTIMONY | | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L | BDL 53 UG/L |
| 102 M ARSENIC | | BDL 1.5 UG/L | BDL 1.5 UG/L | BDL 1.5 UG/L | BDL 1.5 UG/L | BDL 1.5 UG/L | BDL 1.5 UG/L | 10 F UG/L |
| 103 M BERYLLIUM | | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | 1.2 []P UG/L | BDL 1 UG/L |
| 104 M CADMIUM | | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L |
| 105 M CHROMIUM | | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | BDL 5 UG/L | 124 P UG/L | BDL 5 UG/L |
| 106 M COPPER | | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L | BDL 20 UG/L |
| 107 M LEAD | | BDL 2.5 UG/L | BDL 2.5 UG/L | BDL 2.5 UG/L | BDL 2.5 UG/L | BDL 2.5 UG/L | BDL 2.5 UG/L | BDL 2.5 UG/L |
| 108 M MERCURY | | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L | 0.22 CVN UG/L | BDL 0.2 UG/L |
| 109 M NICKEL | | BDL 39 UG/L | BDL 39 UG/L | BDL 39 UG/L | BDL 39 UG/L | BDL 39 UG/L | BDL 39 UG/L | BDL 39 UG/L |
| 110 M SELENIUM | | BDL 1.3 UG/L | BDL 1.3 UG/L | BDL 1.3 UG/L | BDL 1.3 UG/L | BDL 1.3 UG/L | BDL 1.3 UG/L | BDL 1.3 UG/L |
| 111 M SILVER | | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L | BDL 8 UG/L |
| 112 M THALLIUM | | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L | BDL 2.2 UG/L |
| 113 M ZINC | | 11 []P UG/L | 96 P UG/L | 14 []P UG/L | 14 []P UG/L | 164 P UG/L | 15 []P UG/L | 59 P UG/L |
| 114 M BARIUM | | 115 []P UG/L | 92 []P UG/L | 57 []P EUG/L | 55 []P EUG/L | 25 []P UG/L | 20 []P UG/L | 41 []P UG/L |
| 115 M IRON | | 15400 P UG/L | 114 P UG/L | 5000 P UG/L | 4940 P UG/L | 52 []P UG/L | 95 []P UG/L | 13100 P UG/L |
| 116 M MANGANESE | | 1590 P UG/L | 52 P UG/L | 1510 P UG/L | 1490 P UG/L | 9070 P UG/L | 4850 P UG/L | 9820 P UG/L |
| 117 M VANADIUM | | 7 []P UG/L | BDL 3 UG/L | 3.3 []P UG/L | 3.2 []P UG/L | BDL 3 UG/L | BDL 3 UG/L | BDL 3 UG/L |
| 118 M ALUMINUM | | BDL 43 UG/L | BDL 43 UG/L | BDL 43 UG/L | BDL 43 UG/L | BDL 43 UG/L | 262 P UG/L | BDL 43 UG/L |
| 120 M COBALT | | BDL 5 UG/L | BDL 5 UG/L | 37 []P UG/L | 37 []P UG/L | 479 P UG/L | 101 P UG/L | 88 P UG/L |
| 121 M MAGNESIUM | | 21200 P UG/L | 48000 P UG/L | 9690 P E UG/L | 9540 P E UG/L | 10400 P UG/L | 28000 P UG/L | 12900 P UG/L |
| 129 M Calcium | | 53300 P UG/L | 41200 P UG/L | 31400 P E UG/L | 30900 P E UG/L | 29600 P UG/L | 79800 P UG/L | 37300 P UG/L |
| 130 M Sodium | | 23700 P E UG/L | 7840 P E UG/L | 24300 P E UG/L | 24200 P E UG/L | 13500 P UG/L | 18200 P UG/L | 23600 P UG/L |
| 131 M Potassium | | 3700 []P UG/L | 3120 []P UG/L | 2830 []P UG/L | 2800 []P UG/L | BDL 2400 UG/L | BDL 2400 UG/L | 2740 []P UG/L |

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Table 5-19 (Cont'd)

Ground Water Round 2 Metals Results

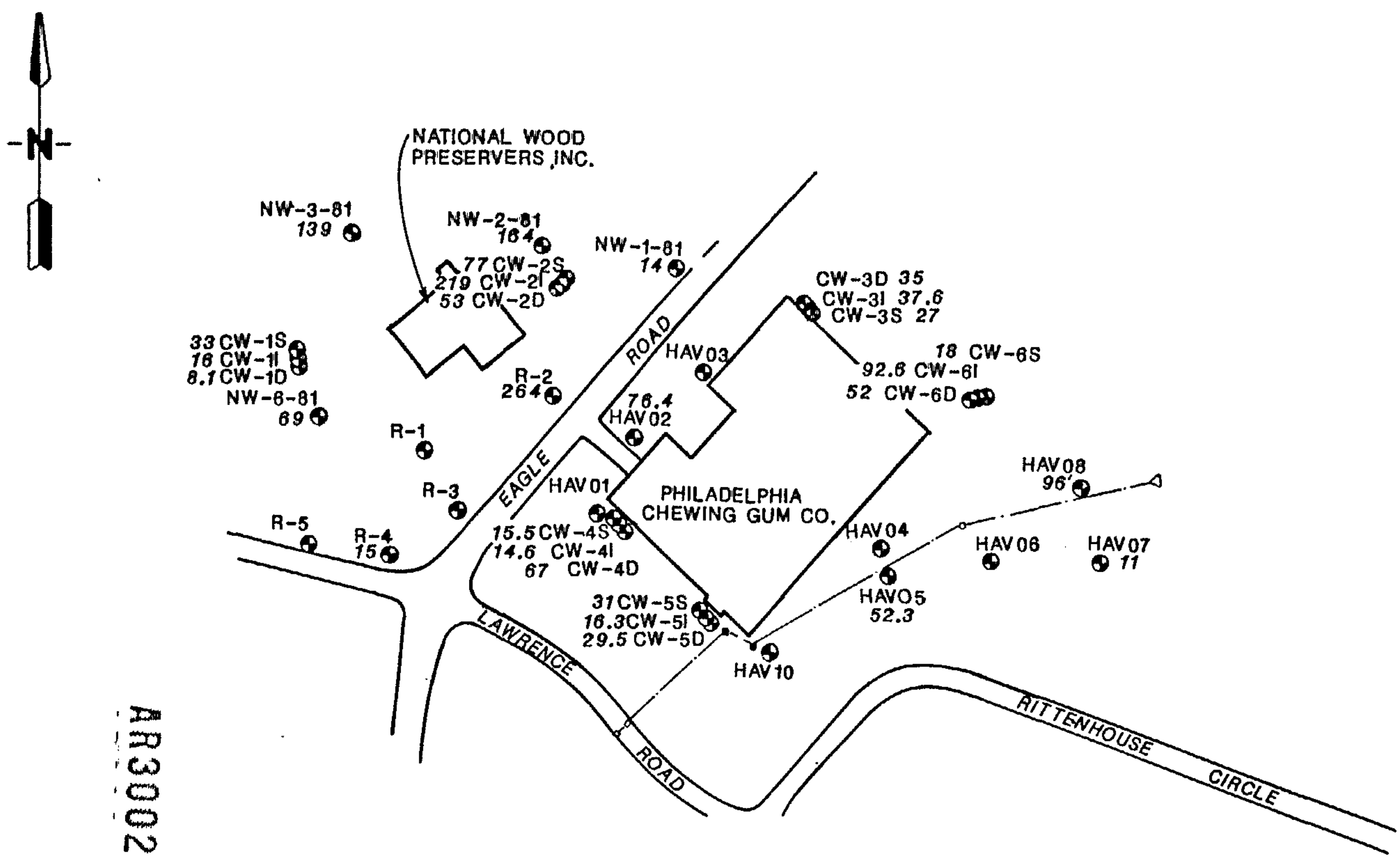
| CMPD | | | | | |
|---|---|---|---|---|---|
| | SITE | 86021 | | 86021 | |
| | SAMPLE | R-2 | | R-4 | |
| | DATE | 03/16/88 | | 03/16/88 | |
| | MATRIX | GNDWAT | | GNDWAT | |
| | METALS LAB I. D. # | 185699 | | 185700 | |
| | ================== | ====== | | ====== | |
| 101 M | ANTIMONY | BDL | 53 UG/L | BDL | 53 UG/L |
| 102 M | ARSENIC | 11 | F UG/L | BDL | 1.5 UG/L |
| 103 M | BERYLLIUM | BDL | 1 UG/L | BDL | 1 UG/L |
| 104 M | CADMIUM | BDL | 5 UG/L | BDL | 5 UG/L |
| 105 M | CHROMIUM | BDL | 5 UG/L | BDL | 5 UG/L |
| 106 M | COPPER | BDL | 20 UG/L | BDL | 20 UG/L |
| 107 M | LEAD | BDL | 2.5 UG/L | BDL | 2.5 UG/L |
| 108 M | MERCURY | BDL | 0.2 UG/L | BDL | 0.2 UG/L |
| 109 M | NICKEL | BDL | 39 UG/L | BDL | 39 UG/L |
| 110 M | SELENIUM | BDL | 1.3 UG/L | 1.3 | []F MUG/L |
| 111 M | SILVER | BDL | 8 UG/L | BDL | 8 UG/L |
| 112 M | THALLIUM | BDL | 2.2 UG/L | BDL | 2.2 UG/L |
| 113 M | ZINC | 253 | P UG/L | 15 | []P UG/L |
| 114 M | BARIUM | 69 | []P UG/L | 130 | []P UG/L |
| 115 M | IRON | 22000 | P UG/L | 25 | []P UG/L |
| 116 M | MANGANESE | 20500 | P UG/L | 44 | P UG/L |
| 117 M | VANADIUM | BDL | 3 UG/L | BDL | 3 UG/L |
| 118 M | ALUMINUM | BDL | 43 UG/L | BDL | 43 UG/L |
| 120 M | COBALT | 113 | P UG/L | BDL | 5 UG/L |
| 121 M | MAGNESIUM | 23800 | P UG/L | 11800 | P UG/L |
| 129 M | Calcium | 62300 | P UG/L | 13900 | P UG/L |
| 130 M | Sodium | 68300 | P UG/L | 10200 | P UG/L |
| 131 M | Potassium | 11300 | P UG/L | BDL | 2400 UG/L |

identified in the groundwater including barium, beryllium, mercury, and selenium.

Figure 5-18 depicts the distribution of total selected metals in the groundwater. Arsenic, cadmium, chromium, copper, lead, and zinc were selected as the metals of concern based upon their health risks and/or their association with NWP operations. From the data presented, it does not appear that any correlation exists between monitoring wells with oil in them, such as R-2 and HAV-02, and elevated concentrations of dissolved metals, when compared to wells containing no oil.

5.3.5.2.2 Volatile Organic Aromatics - Groundwater samples were obtained from 10 selected existing monitoring wells and the 18 newly installed monitoring wells for VOA analysis. The VOAs identified in the groundwater, as shown in Table 5-20, are consistent with those usually associated with solvent and gasoline/fuel oil contamination. The primary chemicals found in the groundwater sampling include benzene, ethylbenzene, trichloroethene, vinyl chloride, total xylenes, and 1,2-dichloroethene (total). Lower concentrations of 1,2-dichloroethane, methylene chloride, toluene, 1,1,2-trichloroethane, acetone, and 1,1-dichloroethene were also found.

A total VOA map was produced by summing the VOA results of each sampling point. Figure 5-19 depicts the results. Upon reviewing the map, an increasing VOA concentration with depth trend is apparent at CW-1, CW-5, and CW-6 series wells. In addition, a decreasing VOA concentration with depth trend is present at the CW-2 series wells. The wells of the CW-3 series indicate that the saprolite units are significantly higher in VOA contamination than the bedrock, while the CW-4 series wells show had essentially

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## LEGEND

EXISTING WELL LOCATIONS

STORM SEWER

200' 0 200'

SCALE IN FEET

**FIGURE 5-18**

**HAVERTOWN PCP SITE**

**HAVERTOWN, PA**

**TOTAL SELECTED METALS (mg/l)**

**GROUNDWATER ROUND 2**

| | | |
|---|---|---|
| drawn CCS | approved JRW | drawing no. |
| checked JST | date 5-26-88 | 86021-035-AA |

r. e. wright associates, inc.
earth resource consultants
middletown pennsylvania

Table 5-20

Ground Water Round 2 Volatile Organic Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 86021 CW-1-D 03/14/88 GNDWAT | | 86021 CW-1-I 03/14/88 GNDWAT | | 86021 CW-1-S 03/14/88 GNDWAT | | 86021 CW-2-D 03/14/88 GNDWAT | | 86021 CW-2-D-DUP 03/14/88 GNDWAT | | 86021 CW-2-I 03/14/88 GNDWAT | | 86021 CW-2-S 03/14/88 GNDWAT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VOC LAB I.D. # | 185187 | | 185183 | | 185144 | | 185188 | | 185189 | | 185149 | | 185133 | |
| 203 V | Benzene | 8 | J ug/l | 1 | J ug/l | BDL | 5 ug/l | 4 | J ug/l | 3 | J ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 205 V | Bromoform | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 206 V | Carbon Tetrachloride | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 207 V | Chlorobenzene | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 208 V | Dibromochloromethane | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 209 V | Chloroethane | BDL | 50 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 211 V | Chloroform | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 212 V | Bromodichloromethane | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 214 V | 1,1-Dichloroethane | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 215 V | 1,2-Dichloroethane | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 216 V | 1,1-Dichloroethene | 10 | J ug/l | 3 | J ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 217 V | 1,2-Dichloropropane | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 218 V | cis-1,3-Dichloropropene | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 219 V | Ethylbenzene | BDL | 25 ug/l | BDL | 5 ug/l | 2 | J ug/l | 8 | ug/l | 7 | ug/l | 15 | ug/l | 20 | ug/l |
| 220 V | Bromomethane | BDL | 50 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 221 V | Chloromethane | BDL | 50 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 222 V | Methylene Chloride | 18 | BJ ug/l | 1 | BJ ug/l | BDL | 5 ug/l | 4 | BJ ug/l | 3 | BJ ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 223 V | 1,1,2,2-Tetrachloroethane | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 224 V | Tetrachloroethene | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 225 V | Toluene | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 4 | J ug/l | 3 | J ug/l | 7 | ug/l | 15 | ug/l |
| 227 V | 1,1,1-Trichloroethane | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 228 V | 1,1,2-Trichloroethane | BDL | 25 ug/l | 2 | J ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 229 V | Trichloroethene | 1700 | ug/l | 700 | D ug/l | 74 | ug/l | 10 | ug/l | 9 | ug/l | 1 | J ug/l | 1 | J ug/l |
| 231 V | Vinyl Chloride | 46 | J ug/l | 15 | ug/l | 2 | J ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| [illegible] V | Trans-1,3-Dichloropropene | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 251 V | Styrene | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 252 V | Acetone | 34 | BJ ug/l | 8 | J ug/l | 8 | J ug/l | 12 | B ug/l | 7 | BJ ug/l | 7 | J ug/l | 13 | ug/l |
| 253 V | 2-Butanone | BDL | 50 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 254 V | Carbon Disulfide | BDL | 25 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l |
| 255 V | 2-Hexanone | BDL | 50 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 256 V | 4-Methyl-2-pentanone | BDL | 50 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 257 V | Vinyl Acetate | BDL | 50 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l |
| 289 V | Xylenes (Total) | BDL | 50 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | 74 | ug/l | 60 | ug/l | 110 | ug/l | 150 | ug/l |
| [illegible] V | 1,2-Dichloroethene(Total) | 720 | ug/l | 300 | D ug/l | 30 | ug/l | 3 | J ug/l | 2 | J ug/l | BDL | 5 ug/l | BDL | 5 ug/l |

Table 5-20 (Cont'd)

Ground Water Round 2 Volatile Organic Results

| CMPO | SITE | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE | CW-3-D | | CW-3-I | | CW-3-S | | CW-4-D | | CW-4-I | | CW-4-S | | CW-5-D | |
| | DATE | 03/09/88 | | 03/09/88 | | 03/09/88 | | 03/08/88 | | 03/08/88 | | 03/08/88 | | 03/08/88 | |
| | MATRIX | GWOWAT | | GWOWAT | | GWOWAT | | GWOWAT | | GWOWAT | | GWOWAT | | GWOWAT | |
| | VOC LAB I.D. # | 104218 | | 104220 | | 104219 | | 103995 | | 103993 | | 103982 | | 183996 | |
| 203 V | Benzene | 4 | B ug/l | 6 | B J ug/l | 5 | B ug/l | 16 | ug/l | 23 | ug/l | 8 | ug/l | 320 | ug/l |
| 205 V | Bromoform | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 206 V | Carbon Tetrachloride | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 207 V | Chlorobenzene | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 208 V | Dibromochloromethane | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 209 V | Chloroethane | BDL | 10 ug/l | BDL | 25 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l |
| 211 V | Chloroform | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 212 V | Bromodichloromethane | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 214 V | 1,1-Dichloroethane | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 215 V | 1,2-Dichloroethane | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | 10 | ug/l | 8 | ug/l | 5 | ug/l | 21 | J ug/l |
| 216 V | 1,1-Dichloroethene | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 217 V | 1,2-Dichloropropane | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 218 V | cis-1,3-Dichloropropene | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 219 V | Ethylbenzene | 2 | B J ug/l | BDL | 13 ug/l | 10 | B ug/l | 12 | ug/l | 5 | ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 220 V | Bromomethane | BDL | 10 ug/l | BDL | 25 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l |
| 221 V | Chloromethane | BDL | 10 ug/l | BDL | 25 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l |
| 222 V | Methylene Chloride | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 1 | B J ug/l | BDL | 5 ug/l | 7 | B J ug/l |
| 223 V | 1,1,2,2-Tetrachloroethane | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 224 V | Tetrachloroethene | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 225 V | Toluene | BDL | 5 ug/l | 17 | ug/l | 6 | ug/l | 7 | ug/l | 3 | J ug/l | BDL | 5 ug/l | 26 | ug/l |
| 227 V | 1,1,1-Trichloroethane | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 228 V | 1,1,2-Trichloroethane | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 229 V | Trichloroethene | 1 | J ug/l | BDL | 13 ug/l | BDL | 5 ug/l | 80 | ug/l | 100 | ug/l | 95 | ug/l | 14 | J ug/l |
| 231 V | Vinyl Chloride | BDL | 10 ug/l | BDL | 25 ug/l | BDL | 10 ug/l | 12 | ug/l | 13 | ug/l | 10 | ug/l | BDL | 50 ug/l |
| 230 V | Trans-1,3-Dichloropropene | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 251 V | Styrene | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 252 V | Acetone | BDL | 10 ug/l | BDL | 25 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | 11 | B ug/l | 8 | B J ug/l | BDL | 50 ug/l |
| 253 V | 2-Butanone | BDL | 10 ug/l | BDL | 25 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l |
| 254 V | Carbon Disulfide | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 25 ug/l |
| 255 V | 2-Hexanone | BDL | 10 ug/l | BDL | 25 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l |
| 256 V | 4-Methyl-2-pentanone | BDL | 10 ug/l | BDL | 25 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l |
| 257 V | Vinyl Acetate | BDL | 10 ug/l | BDL | 25 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 50 ug/l |
| 289 V | Xylenes (Total) | 23 | ug/l | 580 | E ug/l | 410 | E ug/l | 67 | ug/l | 18 | ug/l | 1 | J ug/l | 1400 | E ug/l |
| 299 V | 1,2-Dichloroethene(Total) | BDL | 5 ug/l | BDL | 13 ug/l | BDL | 5 ug/l | 71 | ug/l | 99 | ug/l | 77 | ug/l | 16 | J ug/l |

Table 5-20 (Cont'd)

Ground Water Round 2 Volatile Organic Results

| CMPO | SITE<br>SAMPLE<br>DATE<br>MATRIX | 86021<br>CW-5-I<br>03/08/88<br>GNDWAT | | 86021<br>CW-5-S<br>03/08/88<br>GNDWAT | | 86021<br>CW-6-D<br>03/09/88<br>GNDWAT | | 86021<br>CW-6-I<br>03/10/88<br>GNDWAT | | 86021<br>CW-6-S<br>03/10/88<br>GNDWAT | | 86021<br>HAV-2<br>03/09/88<br>GNDWAT | | 86021<br>HAV-5<br>03/09/88<br>GNDWAT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VOC LAB I.D. # | 183994 | | 183986 | | 184217 | | 184497 | | 184699 | | 184221 | | 184222 | |
| | ============== | ====== | | ====== | | ====== | | ====== | | ====== | | ====== | | ====== | |
| 203 V | Benzene | 250 | D ug/l | 83 | D ug/l | 22 | B ug/l | 7 | ug/l | 4 | J ug/l | 7 | ug/l | 130 | ug/l |
| 205 V | Bromoform | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 206 V | Carbon Tetrachloride | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 207 V | Chlorobenzene | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 208 V | Dibromochloromethane | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 209 V | Chloroethane | BDL | 25 ug/l | BDL | 20 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 13 ug/l |
| 211 V | Chloroform | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 212 V | Bromodichloromethane | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 214 V | 1,1-Dichloroethane | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 215 V | 1,2-Dichloroethane | 16 | D ug/l | 7 | D J ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 6 | J ug/l |
| 216 V | 1,1-Dichloroethene | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 217 V | 1,2-Dichloropropane | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 218 V | cis-1,3-Dichloropropene | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 219 V | Ethylbenzene | BDL | 13 ug/l | BDL | 10 ug/l | 5 | B ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 25 | ug/l | 160 | ug/l |
| 220 V | Bromomethane | BDL | 25 ug/l | BDL | 20 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 13 ug/l |
| 221 V | Chloromethane | BDL | 25 ug/l | BDL | 20 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 13 ug/l |
| 222 V | Methylene Chloride | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 1 | B J ug/l | 2 | B J ug/l | BDL | 6 ug/l |
| 223 V | 1,1,2,2-Tetrachloroethane | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 224 V | Tetrachloroethene | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 225 V | Toluene | 27 | D ug/l | 5 | D J ug/l | 1 | J ug/l | BDL | 5 ug/l | BDL | 5 ug/l | 27 | ug/l | 16 | ug/l |
| 227 V | 1,1,1-Trichloroethane | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 228 V | 1,1,2-Trichloroethane | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 229 V | Trichloroethene | 10 | D J ug/l | 3 | D J ug/l | 34 | ug/l | 30 | ug/l | 5 | ug/l | 25 | ug/l | 6 | J ug/l |
| [illegible] V | Vinyl Chloride | BDL | 25 ug/l | BDL | 20 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | 5 | J ug/l | BDL | 10 ug/l | BDL | 13 ug/l |
| [illegible] V | Trans-1,3-Dichloropropene | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 251 V | Styrene | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| 252 V | Acetone | 12 | D J ug/l | BDL | 20 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | 14 | ug/l | 13 | B ug/l |
| 253 V | 2-Butanone | BDL | 25 ug/l | BDL | 20 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 13 ug/l |
| 254 V | Carbon Disulfide | BDL | 13 ug/l | BDL | 10 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 5 ug/l | BDL | 6 ug/l |
| [illegible] V | 2-Hexanone | BDL | 25 ug/l | BDL | 20 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 13 ug/l |
| 256 V | 4-Methyl-2-pentanone | BDL | 25 ug/l | BDL | 20 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 13 ug/l |
| 257 V | Vinyl Acetate | BDL | 25 ug/l | BDL | 20 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 10 ug/l | BDL | 13 ug/l |
| 289 V | Xylenes (Total) | 950 | D E ug/l | 630 | D E ug/l | 37 | ug/l | 37 | ug/l | BDL | 5 ug/l | 190 | ug/l | 510 | E ug/l |
| 299 V | 1,2-Dichloroethene(Total) | 12 | D J ug/l | 4 | D J ug/l | 25 | ug/l | 33 | ug/l | 7 | ug/l | 9 | ug/l | 6 | J ug/l |

Table 5-20 (Cont'd)

Ground Water Round 2 Volatile Organic Results

| CMPD | SITE<br>SAMPLE<br>DATE<br>MATRIX | 84021<br>MAW-7<br>03/08/88<br>GWDWAT | 84021<br>MAW-8<br>03/08/88<br>GWDWAT | 84021<br>MW-1-81<br>03/10/88<br>GWDWAT | 84021<br>MW-1-81 DUP<br>03/10/88<br>GWDWAT | 84021<br>MW-2-81<br>03/15/88<br>GWDWAT | 84021<br>MW-3-81<br>03/15/88<br>GWDWAT | 84021<br>MW-6-81<br>03/15/88<br>GWDWAT |
|---|---|---|---|---|---|---|---|---|
| | VOC LAB I.D. # | 103997 | 103998 | 104700 | 104701 | 105386 | 105387 | 105388 |
| 203 V | Benzene | 1 J ug/l | 1 J ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | 2 J ug/l |
| 205 V | Bromoform | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 206 V | Carbon Tetrachloride | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 207 V | Chlorobenzene | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 208 V | Dibromochloromethane | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 209 V | Chloroethane | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |
| 211 V | Chloroform | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 212 V | Bromodichloromethane | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 214 V | 1,1-Dichloroethane | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 215 V | 1,2-Dichloroethane | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | 3 J ug/l |
| 216 V | 1,1-Dichloroethene | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | 37 ug/l |
| 217 V | 1,2-Dichloropropane | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 218 V | cis-1,3-Dichloropropene | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 219 V | Ethylbenzene | BDL 5 ug/l | BDL 5 ug/l | 3 J ug/l | 4 J ug/l | 14 ug/l | BDL 5 ug/l | 4 J ug/l |
| 220 V | Bromomethane | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |
| 221 V | Chloromethane | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |
| 222 V | Methylene Chloride | 1 B J ug/l | BDL 5 ug/l | 1 B J ug/l | 2 B J ug/l | 3 BJ ug/l | 4 BJ ug/l | 2 B J ug/l |
| 223 V | 1,1,2,2-Tetrachloroethane | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 224 V | Tetrachloroethene | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | 1 J ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 225 V | Toluene | BDL 5 ug/l | 5 ug/l | 1 J ug/l | 2 J ug/l | BDL 5 ug/l | BDL 5 ug/l | 1 J ug/l |
| 227 V | 1,1,1-Trichloroethane | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 228 V | 1,1,2-Trichloroethane | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 229 V | Trichloroethene | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | 7 ug/l |
| 23[illegible] | Vinyl Chloride | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |
| 25[illegible] | Trans-1,3-Dichloropropene | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 251 V | Styrene | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 252 V | Acetone | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | 8 BJ ug/l | BDL 10 ug/l | BDL 10 ug/l |
| 253 V | 2-Butanone | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |
| 25[illegible] | Carbon Disulfide | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |
| 25[illegible] | 2-Hexanone | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |
| 256 V | 4-Methyl-2-pentanone | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |
| 257 V | Vinyl Acetate | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |
| 289 V | Xylenes (Total) | BDL 5 ug/l | BDL 5 ug/l | 17 ug/l | 18 ug/l | 92 ug/l | 5 ug/l | 3 J ug/l |
| 299 V | 1,2-Dichloroethene(Total) | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l | BDL 5 ug/l |

Table 5-20 (Cont'd)

Ground Water Round 2 Volatile Organic Results

| CMPD | | | | | |
|---|---|---|---|---|---|
| | SITE | 86021 | | 86021 | |
| | SAMPLE | R-2 | | R-4 | |
| | DATE | 03/16/88 | | 03/16/88 | |
| | MATRIX | GNDWAT | | GNDWAT | |
| | VOC LAB I.D. # | 185697 | | 185698 | |
| 203 V | Benzene | 7 | ug/l | BDL | 5 ug/l |
| 205 V | Bromoform | BDL | 5 ug/l | BDL | 5 ug/l |
| 206 V | Carbon Tetrachloride | BDL | 5 ug/l | BDL | 5 ug/l |
| 207 V | Chlorobenzene | BDL | 5 ug/l | BDL | 5 ug/l |
| 208 V | Dibromochloromethane | BDL | 5 ug/l | BDL | 5 ug/l |
| 209 V | Chloroethane | BDL | 10 ug/l | BDL | 10 ug/l |
| 211 V | Chloroform | BDL | 5 ug/l | BDL | 5 ug/l |
| 212 V | Bromodichloromethane | BDL | 5 ug/l | BDL | 5 ug/l |
| 214 V | 1,1-Dichloroethane | BDL | 5 ug/l | BDL | 5 ug/l |
| 215 V | 1,2-Dichloroethane | BDL | 5 ug/l | BDL | 5 ug/l |
| 216 V | 1,1-Dichloroethene | BDL | 5 ug/l | BDL | 5 ug/l |
| 217 V | 1,2-Dichloropropane | BDL | 5 ug/l | BDL | 5 ug/l |
| 218 V | cis-1,3-Dichloropropene | BDL | 5 ug/l | BDL | 5 ug/l |
| 219 V | Ethylbenzene | 36 | ug/l | BDL | 5 ug/l |
| 220 V | Bromomethane | BDL | 10 ug/l | BDL | 10 ug/l |
| 221 V | Chloromethane | BDL | 10 ug/l | BDL | 10 ug/l |
| 222 V | Methylene Chloride | 1 | BJ ug/l | 2 | B J ug/l |
| 223 V | 1,1,2,2-Tetrachloroethane | BDL | 5 ug/l | BDL | 5 ug/l |
| 224 V | Tetrachloroethene | BDL | 5 ug/l | BDL | 5 ug/l |
| 225 V | Toluene | 47 | ug/l | 1 | J ug/l |
| 227 V | 1,1,1-Trichloroethane | BDL | 5 ug/l | BDL | 5 ug/l |
| 228 V | 1,1,2-Trichloroethane | BDL | 5 ug/l | BDL | 5 ug/l |
| 229 V | Trichloroethene | 45 | ug/l | BDL | 5 ug/l |
| 231 V | Vinyl Chloride | 1 | J ug/l | BDL | 10 ug/l |
| 250 V | Trans-1,3-Dichloropropene | BDL | 5 ug/l | BDL | 5 ug/l |
| 251 V | Styrene | BDL | 5 ug/l | BDL | 5 ug/l |
| 252 V | Acetone | 10 | B ug/l | BDL | 10 ug/l |
| 253 V | 2-Butanone | BDL | 10 ug/l | BDL | 10 ug/l |
| 254 V | Carbon Disulfide | BDL | 5 ug/l | BDL | 5 ug/l |
| 255 V | 2-Hexanone | BDL | 10 ug/l | BDL | 10 ug/l |
| 256 V | 4-Methyl-2-pentanone | 4 | J ug/l | BDL | 10 ug/l |
| 257 V | Vinyl Acetate | BDL | 10 ug/l | BDL | 10 ug/l |
| 289 V | Xylenes (Total) | 240 | ug/l | BDL | 5 ug/l |
| 299 V | 1,2-Dichloroethene(Total) | 23 | ug/l | BDL | 5 ug/l |

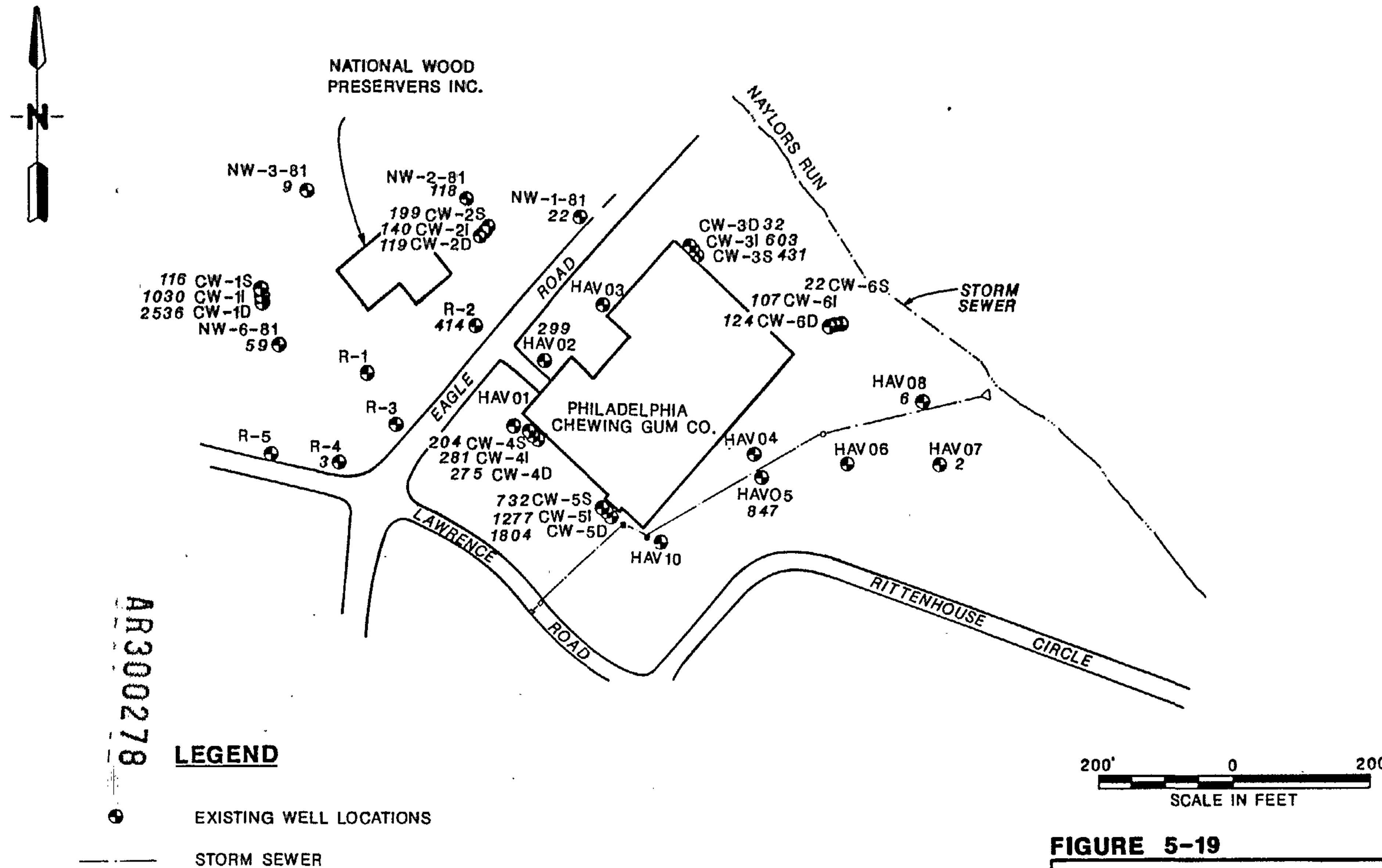




**FIGURE 5-19**

**HAVERTOWN PCP SITE**
HAVERTOWN, PA

TOTAL VOLATILE ORGANIC AROMATICS (ug/l) GROUNDWATER ROUND 2

| | | |
|---|---|---|
| drawn CCS | approved JNN | drawing no. 86021-036-AA |
| checked JST | date 5-26-88 | |

r. e. wright associates, inc. earth resources consultants
middletown pennsylvania

uniform, moderately high VOA contamination throughout the unconsolidated and bedrock aquifers. It is believed that the vertical gradients found at these wells may influence the distribution of contaminants; however, further sampling and water level measurements would be necessary to substantiate this.

There does not appear to be any correlation between the presence of oil in a well and elevated VOA levels, as no trace of oil has been found in wells CW-1I and D; CW-3S and I; CW-4S, I, and D; CW-5S, I, and D; or HAV-05, which have substantially elevated VOA levels. Therefore, sources of VOAs other than the immiscible oil layer are believed to cause increased VOA concentrations in some of the wells. For example, the CW-1 series wells west of NWP are believed to be upgradient of the site, yet their total VOA levels are among the highest measured during this sampling round. Accordingly, it is reasonable that some (unknown) portion of the VOA contamination shown in these wells may be attributed to sources located further upgradient. Based upon the VOA distribution in groundwater around the CW-3 and CW-5 wells, it appears that these are near a source for VOAs.

The elevated levels of VOAs at wells HAV-05, CW-1, CW-3, and CW-5 series also suggest that the dissolved VOA contamination in the groundwater extends beyond the present monitoring well network.

5.3.5.2.3 Base Neutral/Acid Extractables - Groundwater samples were obtained for base neutral and acid extractable (BNA) analysis from 10 selected existing and 18 newly installed monitoring wells. As shown on Table 5-21, relatively few BNA compounds were found in the groundwater samples. The chemicals found in the highest concentrations and with the most regularity were pentachlorophenol (PCP), naphthalene, 2-methylnaphthalene, and phenanthrene, with lower amounts of approximately 15 other BNA compounds.

To assess the distribution of BNAs in groundwater, a total BNA map, Figure 5-20, was produced by summing the concentrations of BNA species above the detection limits for each sampling location. As shown by the map, the groundwater at the site contains substantial quantities of BNA compounds. At monitoring well series CW-1, the concentration of BNAs appears to decrease with depth, as does series CW-2. However, on the PCG property, monitoring well series CW-3, 5, and 6 exhibit the reverse trend where total BNA concentration increases with depth. The presence of elevated concentrations of total BNAs at monitoring wells HAV-05, HAV-08, and series CW-6 indicates that BNA contaminants extend beyond the present monitoring well network. Figure 5-20 also shows that the groundwater in the bedrock is almost as contaminated with dissolved BNAs as the groundwater in the saprolite units.

The most frequently occurring BNA species was PCP, which ranged in concentration from below the detection limit to 4100 ug/l during this sampling round. A complete discussion on the presence of PCP in the groundwater and its relationship to the groundwater plume is discussed further in Section 5.3.6.2.

5.3.5.2.4 Pesticides/PCBs - Groundwater from the 10 selected existing and 18 newly installed monitoring wells was analyzed for pesticides and polychlorinated biphenyls (PCBs).

Table 5-21

Ground Water Round 2 Base Neutral/Acid Extractable Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 86021 CW-1-D 03/14/88 GNDWAT | 86021 CW-1-I 03/14/88 GNDWAT | 86021 CW-1-S 03/14/88 GNDWAT | 86021 CW-2-D 03/14/88 GNDWAT | 86021 CW-2-D-DUP 03/14/88 GNDWAT | 86021 CW-2-I 03/14/88 GNDWAT | 86021 CW-2-S 03/14/88 GNDWAT |
|---|---|---|---|---|---|---|---|---|
| 1 | ACID EXTRACT./ BASE NEUT. LAB I.D.# | 185187 | 185183 | 185144 | 185188 | 185189 | 185149 | 185133 |
| 401 B | Acenaphthene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | 9 J ug/l |
| 402 B | Acenaphthylene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 403 B | Anthracene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | 2 J ug/l |
| 405 B | Benzo(a)Anthracene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 406 B | Benzo(a)Pyrene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 407 B | Benzo(b)Fluoranthene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 408 B | Benzo(g,h,i)Perylene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 409 B | Benzo(k)Fluoranthene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 410 B | bis(-2-Chloroethoxy)Methane | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 411 B | bis(-2-Chloroethyl)Ether | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 412 B | bis(2-chloroisopropyl)Ether | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 413 B | bis(2-Ethylhexyl)Phthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 414 B | 4-Bromophenyl-phenylether | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 415 B | Butylbenzylphthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 416 B | 2-Chloronaphthalene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 417 B | 4-Chlorophenyl-phenylether | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 418 B | Chrysene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 419 B | Dibenz(a,h)Anthracene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 420 B | 1,2-Dichlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 421 B | 1,3-Dichlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 422 B | 1,4-Dichlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 423 B | 3,3'-Dichlorobenzidine | BDL 40 ug/l | BDL 40 ug/l | BDL 40 ug/l | BDL 40 ug/l | BDL 40 ug/l | BDL 40 ug/l | BDL 40 ug/l |
| 424 B | Diethylphthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 425 B | Dimethyl Phthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 426 B | Di-n-Butylphthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 427 B | 2,4-Dinitrotoluene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 428 B | 2,6-Dinitrotoluene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 429 B | Di-n-Octyl Phthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |

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Table 5-21 (Cont'd)

Ground Water Round 2 Base Neutral/Acid Extractable Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 84021 CW-1-D 03/14/88 GNDWAT | 84021 CW-1-I 03/14/88 GNDWAT | 84021 CW-1-S 03/14/88 GNDWAT | 84021 CW-2-D 03/14/88 GNDWAT | 84021 CW-2-D-DUP 03/14/88 GNDWAT | 84021 CW-2-I 03/14/88 GNDWAT | 84021 CW-2-S 03/14/88 GNDWAT |
|---|---|---|---|---|---|---|---|---|
| | ACID EXTRACT./ BASE NEUT. LAB I.D.# | 105107 | 105103 | 105144 | 105108 | 105109 | 105149 | 105133 |
| 431 B | Fluoranthene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 432 B | Fluorene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | 3 J ug/l | 3 J ug/l | 4 J ug/l | 14 J ug/l |
| 433 B | Hexachlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 434 B | Hexachlorobutadiene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 435 B | Hexachlorocyclopentadiene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 436 B | Hexachloroethane | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 437 B | Indeno(1,2,3-cd)Pyrene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 438 B | Isophorone | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 439 B | Naphthalene | BDL 20 ug/l | .2 J ug/l | BDL 20 ug/l | 97 ug/l | 76 ug/l | BDL 20 ug/l | 900 D ug/l |
| 440 B | Nitrobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 442 B | N-Nitroso-Di-n-Propylamine | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 443 B | N-Nitrosodiphenylamine(1) | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 444 B | Phenanthrene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | 8 J ug/l | 8 J ug/l | 8 J ug/l | 19 J ug/l |
| 445 B | Pyrene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | 2 J ug/l |
| 446 B | 1,2,4-Trichlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 474 B | Benzyl Alcohol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 475 B | 4-Chloroaniline | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 476 B | Dibenzofuran | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | 4 J ug/l | 3 J ug/l | 2 J ug/l | 8 J ug/l |
| 477 B | 2-Methylnaphthalene | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | 41 ug/l | 32 ug/l | 120 ug/l | 260 DJ ug/l |
| 478 B | 2-Nitroaniline | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 479 B | 3-Nitroaniline | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 480 B | 4-Nitroaniline | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 601 A | 2-Chlorophenol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 602 A | 2,4-Dichlorophenol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 603 A | 2,4-Dimethylphenol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 604 A | 4,6-Dinitro-2-Methylphenol | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 605 A | 2,4-Dinitrophenol | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 606 A | 2-Nitrophenol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 607 A | 4-Nitrophenol | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 608 A | 4-Chloro-3-Methylphenol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 609 A | Pentachlorophenol | 6 J ug/l | 27 ug/l | 160 ug/l | 1400 D ug/l | 2800 D ug/l | 4100 D ug/l | 2800 D ug/l |
| 610 A | Phenol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 61[illegible] A | 2,4,6-Trichlorophenol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 620 A | 2-Methylphenol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 622 A | 4-Methylphenol | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 625 A | Benzoic Acid | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | 10 J ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 626 A | 2,4,5-Trichlorophenol | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |

Table 5-21 (Cont'd)

Ground Water Round 2 Base Neutral/Acid Extractable Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 86021 CW-3-D 03/09/88 GNDWAT | | 86021 CW-3-I 03/09/88 GNDWAT | | 86021 CW-3-S 03/09/88 GNDWAT | | 86021 CW-4-D 03/08/88 GNDWAT | | 86021 CW-4-I 03/08/88 GNDWAT | | 86021 CW-4-S 03/08/88 GNDWAT | | 86021 CW-5-D 03/08/88 GNDWAT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ACID EXTRACT./ BASE NEUT. LAB I.D.# | 184218 | | 184220 | | 184219 | | 183995 | | 183993 | | 183982 | | 183996 | |
| | ================================== | ====== | | ====== | | ====== | | ====== | | ====== | | ====== | | ====== | |
| 401 B | Acenaphthene | BDL | 20 ug/l | 8 | J ug/l | 6 | J ug/l | 6 | J ug/l | 2 | J ug/l | BDL | 20 ug/l | 4 | J ug/l |
| 402 B | Acenaphthylene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 403 B | Anthracene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 405 B | Benzo(a)Anthracene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 406 B | Benzo(a)Pyrene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 407 B | Benzo(b)Fluoranthene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 408 B | Benzo(g,h,i)Perylene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 409 B | Benzo(k)Fluoranthene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 410 B | bis(-2-Chloroethoxy)Methane | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 411 B | bis(-2-Chloroethyl)Ether | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 412 B | bis(2-chloroisopropyl)Ether | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 413 B | bis(2-Ethylhexyl)Phthalate | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 2 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 414 B | 4-Bromophenyl-phenylether | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 415 B | Butylbenzylphthalate | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 416 B | 2-Chloronaphthalene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 417 B | 4-Chlorophenyl-phenylether | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 418 B | Chrysene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 419 B | Dibenz(a,h)Anthracene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 420 B | 1,2-Dichlorobenzene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 421 B | 1,3-Dichlorobenzene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 422 B | 1,4-Dichlorobenzene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 423 B | 3,3'-Dichlorobenzidine | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l |
| 424 B | Diethylphthalate | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 2 | J ug/l | BDL | 20 ug/l |
| 425 B | Dimethyl Phthalate | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 426 B | Di-n-Butylphthalate | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 427 B | 2,4-Dinitrotoluene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 428 B | 2,6-Dinitrotoluene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 429 B | Di-n-Octyl Phthalate | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |

Table 5-21 (Cont'd)

Ground Water Round 2 Base Neutral/Acid Extractable Results

| CMPD | SITE | 84021 | | 84021 | | 84021 | | 84021 | | 84021 | | 84021 | | 84021 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE | CW-3-D | | CW-3-I | | CW-3-S | | CW-4-D | | CW-4-I | | CW-4-S | | CW-5-D | |
| | DATE | 03/09/88 | | 03/09/88 | | 03/09/88 | | 03/08/88 | | 03/08/88 | | 03/08/88 | | 03/08/88 | |
| | MATRIX | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | |
| | ACID EXTRACT./ BASE NEUT. LAB I.D.# | 184218 | | 184220 | | 184219 | | 183995 | | 183993 | | 183982 | | 183996 | |
| 431 B | Fluoranthene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 432 B | Fluorene | BDL | 20 ug/l | 10 | J ug/l | 6 | J ug/l | 7 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 5 | J ug/l |
| 433 B | Hexachlorobenzene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 434 B | Hexachlorobutadiene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 435 B | Hexachlorocyclopentadiene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 436 B | Hexachloroethane | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 437 B | Indeno(1,2,3-cd)Pyrene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 438 B | Isophorone | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 439 B | Naphthalene | 75 | DJ ug/l | 76 | ug/l | 65 | ug/l | 300 | DJ ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 180 | ug/l |
| 440 B | Nitrobenzene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 442 B | N-Nitroso-Di-n-Propylamine | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 443 B | N-Nitrosodiphenylamine(1) | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 444 B | Phenanthrene | 4 | J ug/l | 11 | J ug/l | 3 | J ug/l | 10 | J ug/l | 3 | J ug/l | BDL | 20 ug/l | 8 | J ug/l |
| 445 B | Pyrene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 446 B | 1,2,4-Trichlorobenzene | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 474 B | Benzyl Alcohol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 475 B | 4-Chloroaniline | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 476 B | Dibenzofuran | 2 | J ug/l | 4 | J ug/l | 3 | J ug/l | 5 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 2 | J ug/l |
| 477 B | 2-Methylnaphthalene | 42 | ug/l | 7 | J ug/l | 2 | J ug/l | 310 | ug/l | 64 | ug/l | 13 | J ug/l | 10 | J ug/l |
| 478 B | 2-Nitroaniline | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 479 B | 3-Nitroaniline | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 480 B | 4-Nitroaniline | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 601 A | 2-Chlorophenol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 602 A | 2,4-Dichlorophenol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 603 A | 2,4-Dimethylphenol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 604 A | 4,6-Dinitro-2-Methylphenol | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 605 A | 2,4-Dinitrophenol | 3 | J ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 606 A | 2-Nitrophenol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 607 A | 4-Nitrophenol | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 608 A | 4-Chloro-3-Methylphenol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 609 A | Pentachlorophenol | 730 | DJ ug/l | 29 | J ug/l | 19 | J ug/l | 2300 | D ug/l | 2500 | D ug/l | 2400 | D ug/l | 790 | ug/l |
| 610 A | Phenol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 611 A | 2,4,6-Trichlorophenol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 620 A | 2-Methylphenol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 622 A | 4-Methylphenol | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 625 A | Benzoic Acid | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 626 A | 2,4,5-Trichlorophenol | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |

Table 5-21 (Cont'd)

Ground Water Round 2 Base Neutral/Acid Extractable Results

| CMPD | SITE | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | | 86021 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE | CW-5-1 | | CW-5-S | | CW-6-D | | CW-6-1 | | CW-6-S | | HAV-2 | | HAV-5 | |
| | DATE | 03/08/88 | | 03/08/88 | | 03/09/88 | | 03/10/88 | | 03/10/88 | | 03/09/88 | | 03/09/88 | |
| | MATRIX | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | | GNDWAT | |
| | ACID EXTRACT./ BASE NEUT. LAB I.D.# | 183994 | | 183986 | | 184217 | | 184697 | | 184699 | | 184221 | | 184222 | |
| 401 B | Acenaphthene | 4 | J ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 12 | J ug/l | 6 | J ug/l |
| 402 B | Acenaphthylene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 403 B | Anthracene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 5 | J ug/l | BDL | 20 ug/l |
| 405 B | Benzo(a)Anthracene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 406 B | Benzo(a)Pyrene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 407 B | Benzo(b)Fluoranthene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 408 B | Benzo(g,h,i)Perylene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 409 B | Benzo(k)Fluoranthene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 410 B | bis(-2-Chloroethoxy)Methane | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 411 B | bis(-2-Chloroethyl)Ether | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 412 B | bis(2-chloroisopropyl)Ether | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 413 B | bis(2-Ethylhexyl)Phthalate | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 414 B | 4-Bromophenyl-phenylether | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 415 B | Butylbenzylphthalate | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 416 B | 2-Chloronaphthalene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 417 B | 4-Chlorophenyl-phenylether | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 418 B | Chrysene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 419 B | Dibenz(a,h)Anthracene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 420 B | 1,2-Dichlorobenzene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 421 B | 1,3-Dichlorobenzene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 422 B | 1,4-Dichlorobenzene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 423 B | 3,3'-Dichlorobenzidine | BDL | 40 ug/l | BDL | 80 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l | BDL | 40 ug/l |
| 424 B | Diethylphthalate | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 2 | J ug/l |
| 425 B | Dimethyl Phthalate | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 426 B | Di-n-Butylphthalate | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | 3 | J ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 427 B | 2,4-Dinitrotoluene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 428 B | 2,6-Dinitrotoluene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 429 B | Di-n-Octyl Phthalate | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |

Table 5-21 (Cont'd)

Ground Water Round 2 Base Neutral/Acid Extractable Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 84021 CW-5-I 03/08/88 GWDWAT | | 84021 CW-5-S 03/08/88 GWDWAT | | 84021 CW-6-D 03/09/88 GWDWAT | | 84021 CW-6-I 03/10/88 GWDWAT | | 84021 CW-6-S 03/10/88 GWDWAT | | 84021 MW-2 03/09/88 GWDWAT | | 84021 MW-5 03/09/88 GWDWAT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ACID EXTRACT./ BASE NEUT. LAB I.D.# | 103994 | | 103986 | | 104217 | | 104497 | | 104499 | | 104221 | | 104222 | |
| 431 B | Fluoranthene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 432 B | Fluorene | 5 | J ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 18 | J ug/l | 6 | J ug/l |
| 433 B | Hexachlorobenzene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 434 B | Hexachlorobutadiene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 435 B | Hexachlorocyclopentadiene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 436 B | Hexachloroethane | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 437 B | Indeno(1,2,3-cd)Pyrene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 438 B | Isophorone | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 439 B | Naphthalene | 120 | ug/l | 17 | D J ug/l | BDL | 20 ug/l | 3 | J ug/l | BDL | 20 ug/l | 680 | D ug/l | 240 | ug/l |
| 440 B | Nitrobenzene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 442 B | N-Nitroso-Di-n-Propylamine | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 443 B | N-Nitrosodiphenylamine(1) | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 444 B | Phenanthrene | 5 | J ug/l | BDL | 40 ug/l | 3 | J ug/l | 3 | J ug/l | BDL | 20 ug/l | 32 | ug/l | 10 | J ug/l |
| 445 B | Pyrene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 446 B | 1,2,4-Trichlorobenzene | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 474 B | Benzyl Alcohol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 475 B | 4-Chloroaniline | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 476 B | Dibenzofuran | 2 | J ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 10 | J ug/l | 3 | J ug/l |
| 477 B | 2-Methylnaphthalene | 5 | J ug/l | BDL | 40 ug/l | 62 | ug/l | BDL | 20 ug/l | BDL | 20 ug/l | 170 | DJ ug/l | 120 | ug/l |
| 478 B | 2-Nitroaniline | BDL | 100 ug/l | BDL | 200 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 479 B | 3-Nitroaniline | BDL | 100 ug/l | BDL | 200 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 480 B | 4-Nitroaniline | BDL | 100 ug/l | BDL | 200 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 601 A | 2-Chlorophenol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 602 A | 2,4-Dichlorophenol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 603 A | 2,4-Dimethylphenol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 604 A | 4,6-Dinitro-2-Methylphenol | BDL | 100 ug/l | BDL | 200 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 605 A | 2,4-Dinitrophenol | BDL | 100 ug/l | BDL | 200 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 606 A | 2-Nitrophenol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 607 A | 4-Nitrophenol | BDL | 100 ug/l | BDL | 200 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 608 A | 4-Chloro-3-Methylphenol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 609 A | Pentachlorophenol | 670 | D ug/l | 120 | D J ug/l | 2400 | D ug/l | 1200 | DJ ug/l | 200 | ug/l | 2300 | D ug/l | 750 | D ug/l |
| 610 A | Phenol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 611 A | 2,4,6-Trichlorophenol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 620 A | 2-Methylphenol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 622 A | 4-Methylphenol | BDL | 20 ug/l | BDL | 40 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l | BDL | 20 ug/l |
| 625 A | Benzoic Acid | 8 | J ug/l | BDL | 200 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |
| 626 A | 2,4,5-Trichlorophenol | BDL | 100 ug/l | BDL | 200 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l | BDL | 100 ug/l |

Table 5-21 (Cont'd)

Ground Water Round 2 Base Neutral/Acid Extractable Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 86021 HAV-7 03/08/88 GNDWAT | 86021 HAV-8 03/08/88 GNDWAT | 86021 MW-1-81 03/10/88 GNDWAT | 86021 MW-1-81 DUP 03/10/88 GNDWAT | 86021 MW-2-81 03/15/88 GNDWAT | 86021 MW-3-81 03/15/88 GNDWAT | 86021 MW-6-81 03/15/88 GNDWAT |
|---|---|---|---|---|---|---|---|---|
| | ACID EXTRACT./ BASE NEUT. LAB I.D.# | 183997 | 183998 | 184700 | 184701 | 185386 | 185387 | 185388 |
| 401 B | Acenaphthene | BDL 20 ug/l | BDL 20 ug/l | 130 ug/l | 81 ug/l | 2 J ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 402 B | Acenaphthylene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | 5 J ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 403 B | Anthracene | BDL 20 ug/l | BDL 20 ug/l | 110 ug/l | 65 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 405 B | Benzo(a)Anthracene | BDL 20 ug/l | BDL 20 ug/l | 24 J ug/l | 9 J ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 406 B | Benzo(a)Pyrene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 407 B | Benzo(b)Fluoranthene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 408 B | Benzo(g,h,i)Perylene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 409 B | Benzo(k)Fluoranthene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 410 B | bis(-2-Chloroethoxy)Methane | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 411 B | bis(-2-Chloroethyl)Ether | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 412 B | bis(2-chloroisopropyl)Ether | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 413 B | bis(2-Ethylhexyl)Phthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 414 B | 4-Bromophenyl-phenylether | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 415 B | Butylbenzylphthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 416 B | 2-Chloronaphthalene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 417 B | 4-Chlorophenyl-phenylether | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 418 B | Chrysene | BDL 20 ug/l | BDL 20 ug/l | 13 J ug/l | 8 J ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 419 B | Dibenz(a,h)Anthracene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 420 B | 1,2-Dichlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | 2 J ug/l | BDL 20 ug/l |
| 421 B | 1,3-Dichlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 422 B | 1,4-Dichlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 423 B | 3,3'-Dichlorobenzidine | BDL 40 ug/l | BDL 40 ug/l | BDL 120 ug/l | BDL 40 ug/l | BDL 40 ug/l | BDL 40 ug/l | BDL 40 ug/l |
| 424 B | Diethylphthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 425 B | Dimethyl Phthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 426 B | Di-n-Butylphthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 427 B | 2,4-Dinitrotoluene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 428 B | 2,6-Dinitrotoluene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | 8 J ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 429 B | Di-n-Octyl Phthalate | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |

Table 5-21 (Cont'd)

Ground Water Round 2 Base Neutral Extractable Results

| CMP# | | SITE | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
|---|---|---|---|---|---|---|---|---|---|
| | | SAMPLE | HAV-7 | HAV-8 | MW-1-01 | MW-1-01 DUP | MW-2-01 | MW-3-01 | MW-6-01 |
| | | DATE | 03/08/88 | 03/08/88 | 03/10/88 | 03/10/88 | 03/15/88 | 03/15/88 | 03/15/88 |
| | | MATRIX | GWDWAT | GWDWAT | GWDWAT | GWDWAT | GWDWAT | GWDWAT | GWDWAT |
| | | ACID EXTRACT./ BASE NEUT. LAB I.D.# | 183997 | 183998 | 184700 | 184701 | 185386 | 185387 | 185388 |
| 431 | B | Fluoranthene | BDL 20 ug/l | BDL 20 ug/l | 42 ug/l | 49 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 432 | B | Fluorene | BDL 20 ug/l | BDL 20 ug/l | 200 ug/l | 120 ug/l | 6 J ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 433 | B | Hexachlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 434 | B | Hexachlorobutadiene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 435 | B | Hexachlorocyclopentadiene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 436 | B | Hexachloroethane | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 437 | B | Indeno(1,2,3-cd)Pyrene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 438 | B | Isophorone | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 439 | B | Naphthalene | BDL 20 ug/l | 15 J ug/l | 1400 D ug/l | 1100 D ug/l | 3 J ug/l | 94 ug/l | 10 J ug/l |
| 440 | B | Nitrobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 442 | B | N-Nitroso-Di-n-Propylamine | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 443 | B | N-Nitrosodiphenylamine(1) | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 444 | B | Phenanthrene | BDL 20 ug/l | BDL 20 ug/l | 500 ug/l | 320 ug/l | 7 J ug/l | 2 J ug/l | BDL 20 ug/l |
| 445 | B | Pyrene | BDL 20 ug/l | BDL 20 ug/l | 100 ug/l | 58 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 446 | B | 1,2,4-Trichlorobenzene | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 474 | B | Benzyl Alcohol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 475 | B | 4-Chloroaniline | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 476 | B | Dibenzofuran | BDL 20 ug/l | BDL 20 ug/l | 72 ug/l | 45 ug/l | 5 J ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 477 | B | 2-Methylnaphthalene | BDL 20 ug/l | BDL 20 ug/l | 730 ug/l | 530 D ug/l | 190 ug/l | 31 ug/l | 3 J ug/l |
| 478 | B | 2-Nitroaniline | BDL 100 ug/l | BDL 100 ug/l | BDL 300 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 479 | B | 3-Nitroaniline | BDL 100 ug/l | BDL 100 ug/l | BDL 300 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 480 | B | 4-Nitroaniline | BDL 100 ug/l | BDL 100 ug/l | BDL 300 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 601 | A | 2-Chlorophenol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 602 | A | 2,4-Dichlorophenol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 603 | A | 2,4-Dimethylphenol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | 6 J ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 604 | A | 4,6-Dinitro-2-Methylphenol | BDL 100 ug/l | BDL 100 ug/l | BDL 300 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 605 | A | 2,4-Dinitrophenol | BDL 100 ug/l | BDL 100 ug/l | BDL 300 ug/l | BDL 100 ug/l | 12 J ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 606 | A | 2-Nitrophenol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 607 | A | 4-Nitrophenol | BDL 100 ug/l | BDL 100 ug/l | BDL 300 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |
| 608 | A | 4-Chloro-3-Methylphenol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 609 | A | Pentachlorophenol | BDL 100 ug/l | 41 J ug/l | 380 ug/l | 300 DJ ug/l | 1500 D ug/l | 95 J ug/l | 520 DJ ug/l |
| 610 | A | Phenol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 611 | A | 2,4,6-Trichlorophenol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 620 | A | 2-Methylphenol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 622 | A | 4-Methylphenol | BDL 20 ug/l | BDL 20 ug/l | BDL 60 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l | BDL 20 ug/l |
| 625 | A | Benzoic Acid | BDL 100 ug/l | BDL 100 ug/l | BDL 300 ug/l | BDL 100 ug/l | 26 J ug/l | BDL 100 ug/l | 4 J ug/l |
| 626 | A | 2,4,5-Trichlorophenol | BDL 100 ug/l | BDL 100 ug/l | BDL 300 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l | BDL 100 ug/l |

Table 5-21 (Cont'd)

Ground Water Round 2 Base Neutral/Acid Extractable Results

| CMPD | | SITE | 86021 | | 86021 | |
|---|---|---|---|---|---|---|
| | | SAMPLE | R-2 | | R-4 | |
| | | DATE | 03/16/88 | | 03/16/88 | |
| | | MATRIX | GNDWAT | | GNDWAT | |
| | ACID EXTRACT./ BASE NEUT. LAB I.D.# | | 185697 | | 185698 | |
| 401 B | Acenaphthene | | 16 | J ug/l | BDL | 20 ug/l |
| 402 B | Acenaphthylene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 403 B | Anthracene | | 4 | J ug/l | BDL | 20 ug/l |
| 405 B | Benzo(a)Anthracene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 406 B | Benzo(a)Pyrene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 407 B | Benzo(b)Fluoranthene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 408 B | Benzo(g,h,i)Perylene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 409 B | Benzo(k)Fluoranthene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 410 B | bis(-2-Chloroethoxy)Methane | | BDL | 20 ug/l | BDL | 20 ug/l |
| 411 B | bis(-2-Chloroethyl)Ether | | BDL | 20 ug/l | BDL | 20 ug/l |
| 412 B | bis(2-chloroisopropyl)Ether | | BDL | 20 ug/l | BDL | 20 ug/l |
| 413 B | bis(2-Ethylhexyl)Phthalate | | BDL | 20 ug/l | BDL | 20 ug/l |
| 414 B | 4-Bromophenyl-phenylether | | BDL | 20 ug/l | BDL | 20 ug/l |
| 415 B | Butylbenzylphthalate | | BDL | 20 ug/l | BDL | 20 ug/l |
| 416 B | 2-Chloronaphthalene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 417 B | 4-Chlorophenyl-phenylether | | BDL | 20 ug/l | BDL | 20 ug/l |
| 418 B | Chrysene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 419 B | Dibenz(a,h)Anthracene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 420 B | 1,2-Dichlorobenzene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 421 B | 1,3-Dichlorobenzene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 422 B | 1,4-Dichlorobenzene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 423 B | 3,3'-Dichlorobenzidine | | BDL | 40 ug/l | BDL | 40 ug/l |
| 424 B | Diethylphthalate | | BDL | 20 ug/l | BDL | 20 ug/l |
| 425 B | Dimethyl Phthalate | | BDL | 20 ug/l | BDL | 20 ug/l |
| 426 B | Di-n-Butylphthalate | | BDL | 20 ug/l | BDL | 20 ug/l |
| 427 B | 2,4-Dinitrotoluene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 428 B | 2,6-Dinitrotoluene | | BDL | 20 ug/l | BDL | 20 ug/l |
| 429 B | Di-n-Octyl Phthalate | | BDL | 20 ug/l | BDL | 20 ug/l |

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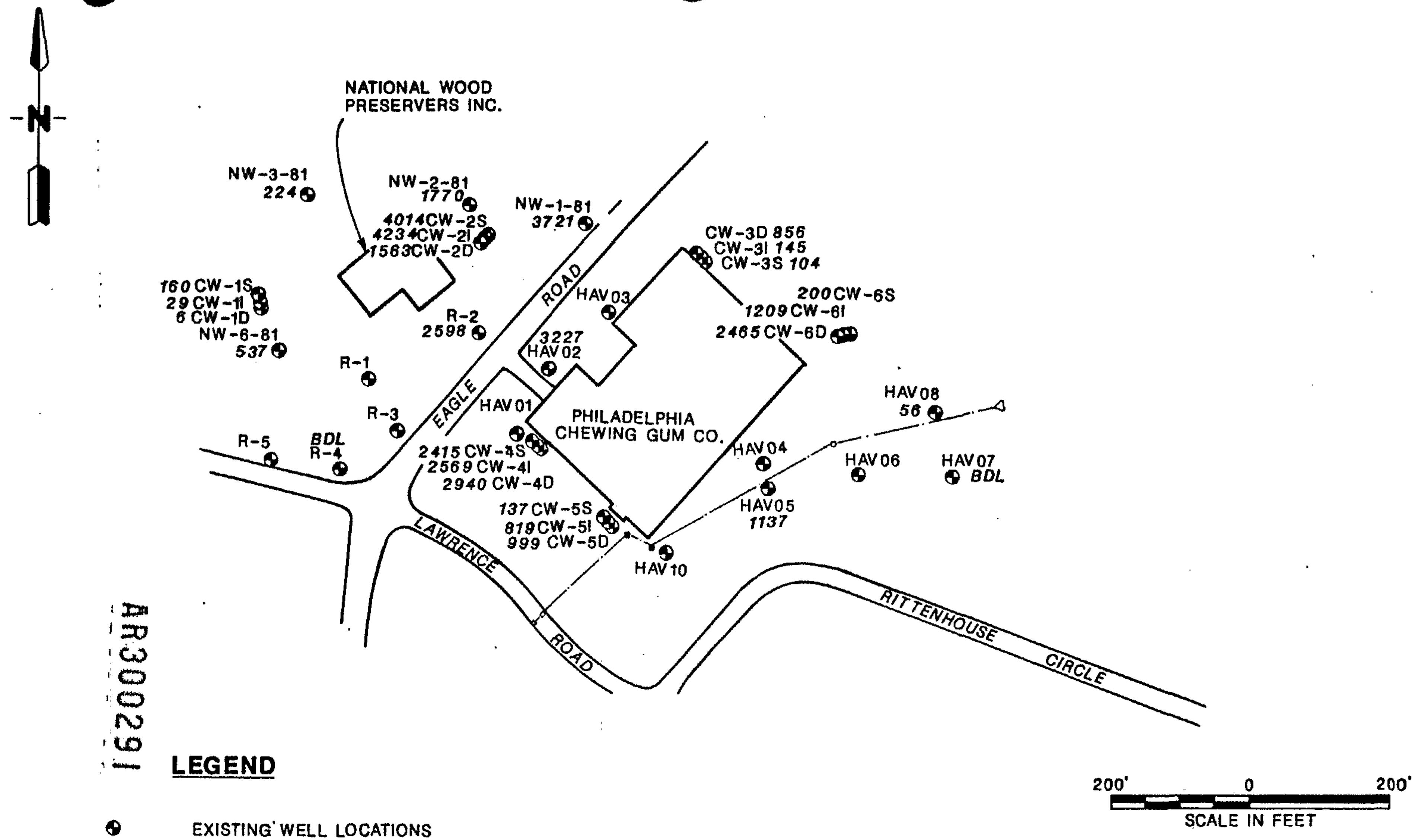
Table 5-21 (Cont'd)

Ground Water Round 2 Base Neutral/Acid Extractable Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 86021 R-2 03/16/88 GNDWAT | | 86021 R-4 03/16/88 GNDWAT | |
|---|---|---|---|---|---|
| | ACID EXTRACT./ BASE NEUT. LAB I.D.# | 185697 | | 185698 | |
| 431 B | Fluoranthene | BDL | 20 ug/l | BDL | 20 ug/l |
| 432 B | Fluorene | 16 | J ug/l | BDL | 20 ug/l |
| 433 B | Hexachlorobenzene | BDL | 20 ug/l | BDL | 20 ug/l |
| 434 B | Hexachlorobutadiene | BDL | 20 ug/l | BDL | 20 ug/l |
| 435 B | Hexachlorocyclopentadiene | BDL | 20 ug/l | BDL | 20 ug/l |
| 436 B | Hexachloroethane | BDL | 20 ug/l | BDL | 20 ug/l |
| 437 B | Indeno(1,2,3-cd)Pyrene | BDL | 20 ug/l | BDL | 20 ug/l |
| 438 B | Isophorone | BDL | 20 ug/l | BDL | 20 ug/l |
| 439 B | Naphthalene | 1400 | D ug/l | BDL | 20 ug/l |
| 440 B | Nitrobenzene | BDL | 20 ug/l | BDL | 20 ug/l |
| 442 B | N-Nitroso-Di-n-Propylamine | BDL | 20 ug/l | BDL | 20 ug/l |
| 443 B | N-Nitrosodiphenylamine(1) | BDL | 20 ug/l | BDL | 20 ug/l |
| 444 B | Phenanthrene | 19 | J ug/l | BDL | 20 ug/l |
| 445 B | Pyrene | BDL | 20 ug/l | BDL | 20 ug/l |
| 446 B | 1,2,4-Trichlorobenzene | BDL | 20 ug/l | BDL | 20 ug/l |
| 474 B | Benzyl Alcohol | BDL | 20 ug/l | BDL | 20 ug/l |
| 475 B | 4-Chloroaniline | BDL | 20 ug/l | BDL | 20 ug/l |
| 476 B | Dibenzofuran | BDL | 20 ug/l | BDL | 20 ug/l |
| 477 B | 2-Methylnaphthalene | 270 | ug/l | BDL | 20 ug/l |
| 478 B | 2-Nitroaniline | BDL | 100 ug/l | BDL | 100 ug/l |
| 479 B | 3-Nitroaniline | BDL | 100 ug/l | BDL | 100 ug/l |
| 480 B | 4-Nitroaniline | BDL | 100 ug/l | BDL | 100 ug/l |
| 601 A | 2-Chlorophenol | BDL | 20 ug/l | BDL | 20 ug/l |
| 602 A | 2,4-Dichlorophenol | BDL | 20 ug/l | BDL | 20 ug/l |
| 603 A | 2,4-Dimethylphenol | BDL | 20 ug/l | BDL | 20 ug/l |
| 604 A | 4,6-Dinitro-2-Methylphenol | BDL | 100 ug/l | BDL | 100 ug/l |
| 605 A | 2,4-Dinitrophenol | BDL | 100 ug/l | BDL | 100 ug/l |
| 606 A | 2-Nitrophenol | BDL | 20 ug/l | BDL | 20 ug/l |
| 607 A | 4-Nitrophenol | BDL | 100 ug/l | BDL | 100 ug/l |
| 608 A | 4-Chloro-3-Methylphenol | BDL | 20 ug/l | BDL | 20 ug/l |
| 609 A | Pentachlorophenol | 860 | J ug/l | BDL | 100 ug/l |
| 610 A | Phenol | BDL | 20 ug/l | BDL | 20 ug/l |
| 611 A | 2,4,6-Trichlorophenol | BDL | 20 ug/l | BDL | 20 ug/l |
| 620 A | 2-Methylphenol | BDL | 20 ug/l | BDL | 20 ug/l |
| 622 A | 4-Methylphenol | BDL | 20 ug/l | BDL | 20 ug/l |
| 625 A | Benzoic Acid | 13 | J ug/l | BDL | 100 ug/l |
| 626 A | 2,4,5-Trichlorophenol | BDL | 100 ug/l | BDL | 100 ug/l |

AR300290




## LEGEND

| | |
|---|---|
| ⊕ | EXISTING WELL LOCATIONS |
| —·— | STORM SEWER |
| BDL | BELOW DETECTION LIMIT |

**FIGURE 5-20**

**HAVERTOWN PCP SITE**
HAVERTOWN, PA

TOTAL BASE NEUTRAL/ACID (ug/l)
EXTRACTABLES
GROUNDWATER ROUND 2

| | | |
|---|---|---|
| drawn CCS | approved JNW | drawing no. |
| checked JST | date 5-26-89 | 86021-037-AA |

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middletown pennsylvania

AR300291

The results of these analyses, shown on Table 5-22, indicate that no PCBs were found in the groundwater above procedural detection limits. In addition, pesticides were only detected in three wells, NW-3-81, R-4, and CW-2D. Well NW-3-81 contained 0.33 ug/l of gamma-BHC, while CW-2D contained 0.73 ug/l of gamma- and delta-BHC. A duplicate sample taken from CW-2D had no pesticides above detection limits. Well R-4 contained 0.22 ug/l of dieldrin. The remaining monitoring well samples did not have pesticide concentrations above detection limits.

5.3.5.2.5 Cyanide and Oil and Grease - Cyanide and oil and grease analyses were performed on groundwater samples taken from the 10 selected existing and 18 newly installed monitoring wells. The results of these analyses are presented in Table 5-22.

Cyanide was only detected in one of the sampled wells, CW-5D, at a concentration of 27 ug/l. There is no indication of the source of cyanide in this bedrock monitoring well.

Oil and grease (O & G) results are also shown on Table 5-22, and reveal that 12 of the 28 wells sampled contained concentrations greater than the detection limits. Well NW-1-81 had the highest O & G value, 12 mg/l, although it contained no noticeable floating oil. Wells with floating oil in them, R-2 and HAV-02, were found to have O & G levels (BDL and 5.4 mg/l respectively) lower than well NW-1-81. Wells of the CW-2 series show a minor decrease in O & G levels with depth. This trend is apparently localized since the CW-3, CW-4, CW-5, and CW-6 series wells show a slight increase in O & G concentration with depth.

Table 5-22

Ground Water Round 2 Pesticide/PCB and Oil & Grease and Cyanide Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 86021 CW-1-D 03/14/88 GNDWAT | 86021 CW-1-I 03/14/88 GNDWAT | 86021 CW-1-S 03/14/88 GNDWAT | 86021 CW-2-D 03/14/88 GNDWAT | 86021 CW-2-D-DUP 03/14/88 GNDWAT | 86021 CW-2-I 03/14/88 GNDWAT | 86021 CW-2-S 03/14/88 GNDWAT |
|---|---|---|---|---|---|---|---|---|
| | PESTICIDE/ PCB LAB ID # | 185187 | 185183 | 185144 | 185188 | 185189 | 185149 | 185133 |
| 701 P | ALDRIN | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 702 P | ALPHA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 703 P | BETA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 704 P | GAMMA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | 0.38 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 705 P | DELTA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | 0.35 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 707 P | 4,4'-DDT | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 708 P | 4,4'-DDE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 709 P | 4,4'-DDD | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 710 P | DIELDRIN | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 711 P | Endosulfan I | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 712 P | Endosulfan II | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 713 P | ENDOSULFAN SULFATE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 714 P | ENDRIN | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 716 P | HEPTACHLOR | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 717 P | HEPTACHLOR EPOXIDE | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 718 P | PCB-1242 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 719 P | PCB-1254 | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 720 P | PCB-1221 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 721 P | PCB-1232 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 722 P | PCB-1248 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 723 P | PCB-1260 | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 724 P | PCB-1016 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 725 P | TOXAPHENE | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 726 P | P,P'-METHOXYCHLOR | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 739 P | ENDRIN KETONE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 747 P | Alpha Chlordane | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 748 P | Gamma Chlordane | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| | OIL & GREASE LAB ID # | 185204 | 185203 | 185201 | 185205 | 185206 | 185202 | 185137 |
| 1033 C | Oil and Grease | BDL 1 mg/l | BDL 1 mg/l | BDL 1 mg/l | 1.1 mg/l | 1 mg/l | 1.3 mg/l | 1.8 mg/l |
| C | CYANIDE | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |

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Table 5-22 (Cont'd)

Ground Water Round 2 Pesticide/PCB and Oil & Grease and Cyanide Results

| CMPD | SITE | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
|---|---|---|---|---|---|---|---|---|
| | SAMPLE | CW-3-D | CW-3-I | CW-3-S | CW-4-D | CW-4-I | CW-4-S | CW-5-D |
| | DATE | 03/09/88 | 03/09/88 | 03/09/88 | 03/08/88 | 03/08/88 | 03/08/88 | 03/08/88 |
| | MATRIX | GWAT | GWAT | GWAT | GWAT | GWAT | GWAT | GWAT |
| | PESTICIDE/ PCB LAB ID # | 184218 | 184220 | 184219 | 183995 | 183993 | 183982 | 183996 |
| 701 P | ALDRIN | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 702 P | ALPHA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 703 P | BETA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 704 P | GAMMA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 705 P | DELTA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 707 P | 4,4'-DDT | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 708 P | 4,4'-DDE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 709 P | 4,4'-DDD | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 710 P | DIELDRIN | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 711 P | Endosulfan I | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 712 P | Endosulfan II | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 713 P | ENDOSULFAN SULFATE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 714 P | ENDRIN | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 716 P | HEPTACHLOR | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 717 P | HEPTACHLOR EPOXIDE | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 718 P | PCB-1242 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 719 P | PCB-1254 | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 720 P | PCB-1221 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 721 P | PCB-1232 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 722 P | PCB-1248 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 723 P | PCB-1260 | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 724 P | PCB-1016 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 725 P | TOXAPHENE | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 726 P | P,P'-METHOXYCHLOR | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 727 P | ENDRIN KETONE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 747 P | Alpha Chlordane | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 748 P | Gamma Chlordane | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| | OIL & GREASE LAB ID # | 184230 | 184232 | 184231 | 184028 | 184203 | 184018 | 184030 |
| 1033 C | Oil and Grease | BDL 1 mg/l | BDL 1 mg/l | 1.4 mg/l | 2 mg/kg | 1.3 mg/kg | BDL 1 mg/kg | 3.5 mg/kg |
| C | CYANIDE | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | 27 ug/l |

Table 5-22 (Cont'd)

Ground Water Round 2 Pesticide/PCB and Oil & Grease and Cyanide Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 86021 CW-5-1 03/08/88 GNDWAT | 86021 CW-5-S 03/08/88 GNDWAT | 86021 CW-6-D 03/09/88 GNDWAT | 86021 CW-6-1 03/10/88 GNDWAT | 86021 CW-6-S 03/10/88 GNDWAT | 86021 HAV-2 03/09/88 GNDWAT | 86021 HAV-5 03/09/88 GNDWAT |
|---|---|---|---|---|---|---|---|---|
| | PESTICIDE/ PCB LAB ID # | 183994 | 183986 | 184217 | 184697 | 184699 | 184221 | 184222 |
| 701 P | ALDRIN | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 702 P | ALPHA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 703 P | BETA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 704 P | GAMMA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 705 P | DELTA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 707 P | 4,4'-DDT | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 708 P | 4,4'-DDE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 709 P | 4,4'-DDD | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 710 P | DIELDRIN | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 711 P | Endosulfan I | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 712 P | Endosulfan II | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 713 P | ENDOSULFAN SULFATE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 714 P | ENDRIN | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 716 P | HEPTACHLOR | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 717 P | HEPTACHLOR EPOXIDE | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 718 P | PCB-1242 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 719 P | PCB-1254 | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 720 P | PCB-1221 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 721 P | PCB-1232 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 722 P | PCB-1248 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 723 P | PCB-1260 | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 724 P | PCB-1016 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 725 P | TOXAPHENE | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 726 P | P,P'-METHOXYCHLOR | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 739 P | ENDRIN KETONE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 747 P | Alpha Chlordane | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 748 P | Gamma Chlordane | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| | OIL & GREASE LAB ID # | 184026 | 184019 | 184229 | 184706 | 184707 | 184233 | 184234 |
| 1033 C | Oil and Grease | 3.1 mg/kg | 2.9 mg/kg | 1 mg/l | BDL 1 mg/l | BDL 1 mg/l | 5.4 mg/l | 1.8 mg/l |
| C | CYANIDE | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |

Table 5-22 (Cont'd)

Ground Water Round 2 Pesticide/PCB and Oil & Grease Cyanide Results

| CMPD | SITE / SAMPLE / DATE / MATRIX | 86021 / MAW-7 / 03/08/88 / GWDWAT | 86021 / MAW-8 / 03/08/88 / GWDWAT | 86021 / MW-1-01 / 03/10/88 / GWDWAT | 86021 / MW-1-01 DUP / 03/10/88 / GWDWAT | 86021 / MW-2-01 / 03/15/88 / GWDWAT | 86021 / MW-3-01 / 03/15/88 / GWDWAT | 86021 / MW-6-01 / 03/15/88 / GWDWAT |
|---|---|---|---|---|---|---|---|---|
| | PESTICIDE/ PCB LAB ID # | 183997 | 183998 | 184700 | 184701 | 185386 | 185387 | 185388 |
| 701 P | ALDRIN | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 702 P | ALPHA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 703 P | BETA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 704 P | GAMMA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | 0.33 ug/l | BDL 0.05 ug/l |
| 705 P | DELTA-BHC | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 707 P | 4,4'-DDT | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 708 P | 4,4'-DDE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 709 P | 4,4'-DDD | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 710 P | DIELDRIN | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 711 P | Endosulfan I | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 712 P | Endosulfan II | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 713 P | ENDOSULFAN SULFATE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 714 P | ENDRIN | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 716 P | HEPTACHLOR | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 717 P | HEPTACHLOR EPOXIDE | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.1 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 718 P | PCB-1242 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.1 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 719 P | PCB-1254 | BDL 1 ug/l | BDL 1 ug/l | BDL 2 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 720 P | PCB-1221 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 721 P | PCB-1232 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 722 P | PCB-1248 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 723 P | PCB-1260 | BDL 1 ug/l | BDL 1 ug/l | BDL 2 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 724 P | PCB-1016 | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 725 P | TOXAPHENE | BDL 1 ug/l | BDL 1 ug/l | BDL 2 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l | BDL 1 ug/l |
| 726 P | P,P'-METHOXYCHLOR | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 739 P | ENDRIN KETONE | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.2 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 742 P | Alpha Chlordane | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 743 P | Gamma Chlordane | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 1 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l | BDL 0.5 ug/l |
| | OIL & GREASE LAB ID # | 184031 | 184032 | 184710 | 184712 | 185394 | 185395 | 185396 |
| 1033 C | Oil and Grease | BDL 1 mg/kg | BDL 1 mg/kg | 12 mg/l | 13 mg/l | 1.8 mg/l | BDL 1 mg/l | 1.5 mg/l |
| C | CYANIDE | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l | BDL 10 ug/l |

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Table 5-22 (Cont'd)

Ground Water Round 2 Pesticide/PCB and Oil & Grease and Cyanide Results

| CMPD | | SITE | 86021 | 86021 |
|---|---|---|---|---|
| | | SAMPLE | R-2 | R-4 |
| | | DATE | 03/16/88 | 03/16/88 |
| | | MATRIX | GNDWAT | GNDWAT |
| | | PESTICIDE/ PCB LAB ID # | 185697 | 185698 |
| 701 P | ALDRIN | | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 702 P | ALPHA-BHC | | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 703 P | BETA-BHC | | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 704 P | GAMMA-BHC | | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 705 P | DELTA-BHC | | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 707 P | 4,4'-DDT | | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 708 P | 4,4'-DDE | | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 709 P | 4,4'-DDD | | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 710 P | DIELDRIN | | BDL 0.1 ug/l | 0.22 ug/l |
| 711 P | Endosulfan I | | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 712 P | Endosulfan II | | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 713 P | ENDOSULFAN SULFATE | | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 714 P | ENDRIN | | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 716 P | HEPTACHLOR | | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 717 P | HEPTACHLOR EPOXIDE | | BDL 0.05 ug/l | BDL 0.05 ug/l |
| 718 P | PCB-1242 | | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 719 P | PCB-1254 | | BDL 1 ug/l | BDL 1 ug/l |
| 720 P | PCB-1221 | | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 721 P | PCB-1232 | | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 722 P | PCB-1248 | | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 723 P | PCB-1260 | | BDL 1 ug/l | BDL 1 ug/l |
| 724 P | PCB-1016 | | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 725 P | TOXAPHENE | | BDL 1 ug/l | BDL 1 ug/l |
| 726 P | P,P'-METHOXYCHLOR | | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 739 P | ENDRIN KETONE | | BDL 0.1 ug/l | BDL 0.1 ug/l |
| 747 P | Alpha Chlordane | | BDL 0.5 ug/l | BDL 0.5 ug/l |
| 748 P | Gamma Chlordane | | BDL 0.5 ug/l | BDL 0.5 ug/l |
| | | OIL & GREASE LAB ID # | 185702 | 185704 |
| 1033 C | Oil and Grease | | BDL 1 mg/l | 4 mg/l |
| C | CYANIDE | | BDL 10 ug/l | BDL 10 ug/l |

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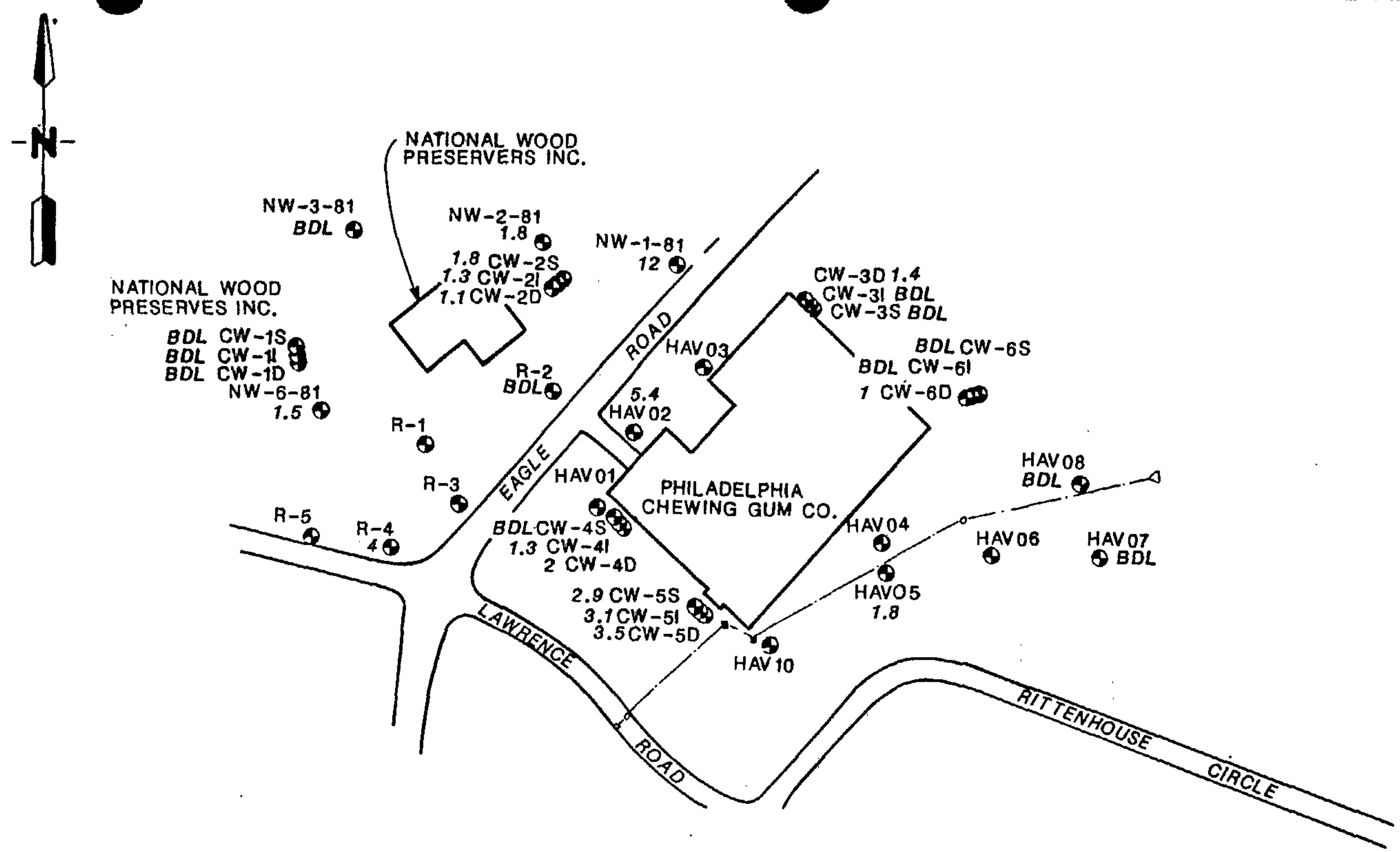
The O & G data from Table 5-22 are presented in Figure 5-21 to depict the distribution of O & G. A minor trend toward O & G concentrations increasing in the bedrock, while decreasing in the saprolite units, is shown as one moves from west to east downgradient across the site.

5.3.5.2.6 Dioxins and Dibenzofurans - Groundwater samples from sampling round #2 were analyzed for dioxin and chlorinated dibenzofuran isomers by CompuChem's sister laboratory, ChemWest. The results of this analysis are shown on Tables 5-23 and 5-24. The primary dioxin isomers identified in the groundwater samples were hepta-, 1234678-hepta-, and octa-chlorinated dibenzo-p-dioxin species.

To better evaluate the spatial relationship of the data, the dioxin isomer groups identified were summed and plotted on Figure 5-22 in parts per trillion (ppt). The anticipated upgradient cluster well series CW-1, shows that dioxin was found in a relatively small amount (1.6 ppt) in only the shallow monitoring well (CW-1S). The presence of dioxin in only the shallow well may be the result of vertical migration, or leaching, of dioxin from potentially contaminated surface soils. This may also be the case for the existing well NW-3-81 (2.4 ppt). The highest concentration of dioxin found in this sampling round was at the existing well NW-1-81 (5331 ppt). Judging from the wells sampled around NW-1-81, it would appear that the dioxin is most concentrated near this well. The reason for the dioxin concentration at NW-1-81 is undetermined, as the well does not contain the free-floating contaminated oil in it as do wells R-2 and HAV-02. Therefore, it would seem that




## LEGEND

EXISTING WELL LOCATIONS

STORM SEWER

BDL BELOW DETECTION LIMIT

200' 0 200'

SCALE IN FEET

**FIGURE 5-21**

**HAVERTOWN PCP SITE**
**HAVERTOWN, PA**

**OIL AND GREASE (mg/l)**
**GROUNDWATER ROUND 2**

| | | |
|---|---|---|
| drawn CCS | approved JRW | drawing no. |
| checked JST | date 5-25-88 | 86021-038-AA |

r. e. wright associates, inc.
earth resources consultants
middletown pennsylvania

Table 5-23

Ground Water Round 2 Dioxin Results

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | CW-1-S | CW-1-I | CW-1-D | CW-2-S | CW-2-I | CW-2-D | CW-2-D (DUP) |
| LAB ID #: | 185207 | 185211 | 185212 | 185139 | 185208 | 185214 | 185213 |
| GC/MS DATE: | 4-13-88 | 4-13-88 | 4-14-88 | 4-13-88 | 4-13-88 | 4-14-88 | 4-14-88 |
| GC/MS TIME: | 22:38 | 23:58 | 15:44 | 22:00 | 23:16 | 18:28 | 17:50 |
| CW # : | 1166-2 | 1166-4 | 1166-5 | 1166-1 | 1166-3 | 1166-7 | 1166-6RE |
| COP NAME | | | | | | | |
| TCDD | BDL 0.38 ppt | BDL 0.59 ppt | BDL 0.37 ppt | BDL 0.67 ppt | BDL 0.42 ppt | BDL 1.8 ppt | BDL 0.71 ppt |
| 2378 TCDD | BDL 0.3 ppt | BDL 0.52 ppt | BDL 0.4 ppt | BDL 0.54 ppt | BDL 0.47 ppt | BDL 1.8 ppt | BDL 0.71 ppt |
| PeCDD | BDL 0.77 ppt | BDL 1.1 ppt | BDL 0.73 ppt | BDL 0.79 ppt | BDL 0.84 ppt | BDL 1.7 ppt | BDL 1.4 ppt |
| 12378 PeCDD | BDL 0.77 ppt | BDL 1.1 ppt | BDL 0.78 ppt | BDL 0.79 ppt | BDL 0.84 ppt | BDL 1.7 ppt | BDL 1.4 ppt |
| HxCDD | BDL 0.62 ppt | BDL 0.77 ppt | BDL 0.59 ppt | BDL 0.7 ppt | BDL 0.64 ppt | BDL 1.5 ppt | BDL 1.0 ppt |
| 123478 HxCDD | BDL 0.62 ppt | BDL 0.77 ppt | BDL 0.62 ppt | BDL 0.7 ppt | BDL 0.64 ppt | BDL 1.5 ppt | BDL 1.0 ppt |
| 123678 HxCDD | BDL 0.62 ppt | BDL 0.77 ppt | BDL 0.62 ppt | BDL 0.7 ppt | BDL 0.64 ppt | BDL 1.5 ppt | BDL 1.0 ppt |
| 123789 HxCDD | BDL 0.62 ppt | BDL 0.77 ppt | BDL 0.62 ppt | BDL 0.7 ppt | BDL 0.64 ppt | BDL 1.5 ppt | BDL 1.0 ppt |
| HpCDD | BDL 0.63 ppt | BDL 0.89 ppt | BDL 0.68 ppt | 10.7 ppt | BDL 1.5 ppt | BDL 0.98 ppt | BDL 1.2 ppt |
| 1234678 HpCDD | BDL 0.63 ppt | BDL 0.89 ppt | BDL 0.91 ppt | 7.0 ppt | BDL 1.5 ppt | BDL 0.98 ppt | BDL 1.2 ppt |
| OCDD | 1.6 ppt | BDL 1.1 ppt | BDL 2.3 ppt | 41.7 ppt | 4.9 ppt | BDL 2.5 ppt | BDL 1.3 ppt |

Table 5-23 (Cont'd)

Ground Water Round 2 Dioxin Results

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | CW-3-S | CW-3-I | CW-3-D | CW-4-S | CW-4-I | CW-4-D | CW-5-S |
| LAB ID #: | 184239 | 184240 | 184238 | 184033 | 184037 | 184041 | 184306 |
| GC/MS DATE: | 4-09-88 | 4-09-88 | 4-09-88 | 4-08-88 | 4-08-88 | 4-08-88 | 4-04-88 |
| GC/MS TIME: | 12:06 | 12:44 | 11:27 | 14:35 | 11:43 | 16:31 | 15:15 |
| CW # : | 1161-3 | 1161-4 | 1161-2 | 1141-1 | 1141-3 | 1141-5 | 1141-2 |
| CDP NAME | | | | | | | |
| TCDD | BDL 0.66 ppt | BDL 0.43 ppt | BDL 0.15 ppt | BDL 0.19 ppt | BDL 0.16 ppt | BDL 0.13 ppt | BDL 0.27 ppt |
| 2378 TCDD | BDL 0.36 ppt | BDL 0.31 ppt | BDL 0.17 ppt | BDL 0.3 ppt | BDL 0.25 ppt | BDL 0.086 ppt | BDL 0.22 ppt |
| PeCDD | BDL 0.59 ppt | BDL 2.0 ppt | BDL 0.8 ppt | BDL 0.62 ppt | BDL 0.57 ppt | BDL 0.45 ppt | BDL 0.5 ppt |
| 12378 PeCDD | BDL 0.59 ppt | BDL 2.0 ppt | BDL 0.8 ppt | BDL 0.62 ppt | BDL 0.57 ppt | BDL 0.45 ppt | BDL 0.5 ppt |
| HxCDD | BDL 1.1 ppt | BDL 1.5 ppt | BDL 0.56 ppt | BDL 0.43 ppt | BDL 0.46 ppt | BDL 0.29 ppt | BDL 0.35 ppt |
| 123478 HxCDD | BDL 1.1 ppt | BDL 1.5 ppt | BDL 0.56 ppt | BDL 0.43 ppt | BDL 0.46 ppt | BDL 0.29 ppt | BDL 0.35 ppt |
| 123678 HxCDD | BDL 1.1 ppt | BDL 1.5 ppt | BDL 0.56 ppt | BDL 0.43 ppt | BDL 0.46 ppt | BDL 0.29 ppt | BDL 0.35 ppt |
| 123789 HxCDD | BDL 1.1 ppt | BDL 1.5 ppt | BDL 0.56 ppt | BDL 0.43 ppt | BDL 0.46 ppt | BDL 0.29 ppt | BDL 0.35 ppt |
| HpCDD | BDL 0.86 ppt | BDL 1.3 ppt | BDL 0.48 ppt | BDL 0.46 ppt | BDL 0.43 ppt | BDL 0.18 ppt | BDL 1.1 ppt |
| 1234678 HpCDD | BDL 0.86 ppt | BDL 1.4 ppt | BDL 0.48 ppt | BDL 0.46 ppt | BDL 0.43 ppt | BDL 0.18 ppt | BDL 1.1 ppt |
| OCDD | BDL 2.0 ppt | BDL 2.4 ppt | BDL 0.9 ppt | BDL 1.2 ppt | BDL 0.55 ppt | BDL 0.72 ppt | 6.6 ppt |

Table 5-23 (Cont'd)

Ground Water Round 2 Dioxin Results

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | CW-5-I | CW-5-D | CW-6-S | CW-6-I | CW-6-D | HAV-2 | HAV-5 |
| LAB ID #: | 184040 | 184042 | 184716 | 184713 | 184235 | 184241 | 184242 |
| GC/MS DATE: | 4-08-88 | 4-08-88 | 4-13-88 | 4-13-88 | 4-09-88 | 4-09-88 | 4-09-88 |
| GC/MS TIME: | 15:53 | 17:14 | 19:24 | 17:28 | 10:50 | 13:22 | 14:00 |
| CW # : | 1141-4 | 1141-6 | 1163-2 | 1163-1 | 1161-1 | 1161-5 | 1161-6 |
| COP NAME | | | | | | | |
| TCDD | BDL 0.12 ppt | BDL 0.15 ppt | BDL 0.19 ppt | BDL 0.26 ppt | BDL 0.5 ppt | BDL 0.32 ppt | BDL 0.23 ppt |
| 2378 TCDD | BDL 0.17 ppt | BDL 0.13 ppt | BDL 0.19 ppt | BDL 0.26 ppt | BDL 0.39 ppt | BDL 0.52 ppt | BDL 0.26 ppt |
| PeCDD | BDL 0.88 ppt | BDL 0.57 ppt | BDL 0.51 ppt | BDL 0.57 ppt | BDL 0.83 ppt | BDL 1.2 ppt | BDL 1.1 ppt |
| 12378 PeCDD | BDL 0.88 ppt | BDL 0.57 ppt | BDL 0.51 ppt | BDL 0.57 ppt | BDL 0.83 ppt | BDL 1.5 ppt | BDL 1.1 ppt |
| HxCDD | BDL 0.51 ppt | BDL 0.41 ppt | BDL 0.38 ppt | BDL 0.43 ppt | BDL 0.95 ppt | BDL 0.92 ppt | BDL 0.74 ppt |
| 123478 HxCDD | BDL 0.51 ppt | BDL 0.41 ppt | BDL 0.38 ppt | BDL 0.43 ppt | BDL 0.95 ppt | BDL 0.92 ppt | BDL 0.74 ppt |
| 123678 HxCDD | BDL 0.51 ppt | BDL 0.41 ppt | BDL 0.38 ppt | BDL 0.43 ppt | BDL 0.95 ppt | BDL 0.92 ppt | BDL 0.74 ppt |
| 123789 HxCDD | BDL 0.51 ppt | BDL 0.41 ppt | BDL 0.38 ppt | BDL 0.43 ppt | BDL 0.95 ppt | BDL 0.92 ppt | BDL 0.74 ppt |
| HpCDD | BDL 0.36 ppt | BDL 0.36 ppt | BDL 0.47 ppt | BDL 0.52 ppt | BDL 0.92 ppt | 30.2 ppt | BDL 0.63 ppt |
| 1234678 HpCDD | BDL 0.36 ppt | BDL 0.36 ppt | BDL 0.47 ppt | BDL 0.52 ppt | BDL 0.92 ppt | 20.7 ppt | BDL 0.69 ppt |
| OCDD | BDL 0.83 ppt | BDL 0.89 ppt | BDL 0.64 ppt | BDL 0.99 ppt | BDL 1.3 ppt | 137 ppt | 1.9 ppt |

Table 5-23 (Cont'd)

Ground Water Round 2 Dioxin Results

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | HAV-7 | HAV-8 | MW-1 | MW-1(DUP) | MW-2 | MW-3 | MW-6 |
| LAB ID #: | 184043 | 184044 | 184717RX | 184718RX | 185397 | 185398 | 185399 |
| GC/MS DATE: | 4-08-88 | 4-08-88 | 4-15-88 | 4-15-88 | 4-14-88 | 4-14-88 | 4-14-88 |
| GC/MS TIME: | 17:52 | 18:30 | 11:38 | 12:19 | 19:06 | 19:44 | 20:22 |
| CW # : | 1141-7 | 1141-8 | 1163-3RX | 1163-4RX | 1179-1 | 1179-2 | 1179-3 |
| CMP NAME | | | | | | | |
| TCDD | BDL 0.17 ppt | BDL 0.21 ppt | BDL 10.3 ppt | BDL 17.7 ppt | BDL 0.67 ppt | BDL 0.68 ppt | BDL 0.77 ppt |
| 2378 TCDD | BDL 0.19 ppt | BDL 0.21 ppt | BDL 16.2 ppt | BDL 18.9 ppt | BDL 0.67 ppt | BDL 0.68 ppt | BDL 0.77 ppt |
| PeCDD | BDL 0.59 ppt | BDL 0.84 ppt | BDL 24.4 ppt | BDL 27.3 ppt | BDL 1.2 ppt | BDL 1.1 ppt | BDL 0.53 ppt |
| 12378 PeCDD | BDL 0.59 ppt | BDL 0.84 ppt | BDL 24.3 ppt | BDL 27.3 ppt | BDL 1.2 ppt | BDL 1.1 ppt | BDL 0.53 ppt |
| HxCDD | BDL 0.44 ppt | BDL 0.57 ppt | BDL 18.0 ppt | BDL 19.7 ppt | BDL 0.98 ppt | BDL 1.0 ppt | BDL 1.2 ppt |
| 123478 HxCDD | BDL 0.44 ppt | BDL 0.57 ppt | BDL 19.6 ppt | BDL 19.7 ppt | BDL 0.98 ppt | BDL 1.0 ppt | BDL 1.2 ppt |
| 123678 HxCDD | BDL 0.44 ppt | BDL 0.57 ppt | BDL 19.6 ppt | BDL 19.7 ppt | BDL 0.98 ppt | BDL 1.0 ppt | BDL 1.2 ppt |
| 123789 HxCDD | BDL 0.44 ppt | BDL 0.57 ppt | BDL 19.6 ppt | BDL 19.7 ppt | BDL 0.98 ppt | BDL 1.0 ppt | BDL 1.2 ppt |
| HpCDD | BDL 0.045 ppt | BDL 0.47 ppt | 860 ppt | 500 ppt | 2.4 ppt | BDL 1.1 ppt | BDL 1.5 ppt |
| 1234678 HpCDD | BDL 0.045 ppt | BDL 0.47 ppt | 579 ppt | 317 ppt | 2.4 ppt | BDL 1.1 ppt | BDL 1.5 ppt |
| OCDD | 0.88 ppt | BDL 0.84 ppt | 4471 ppt | 2425 ppt | 13.1 ppt | 2.4 ppt | BDL 1.3 ppt |

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Table 5-23 (Cont'd)

Ground Water Round 2 Dioxin Results

| | | |
|---|---|---|
| SITE: | 86021 | 86021 |
| POINT: | R-2 | R-4 |
| LAB ID #: | 185706 | 185709 |
| GC/MS DATE: | 4-14-88 | 4-14-88 |
| GC/MS TIME: | 20:59 | 21:36 |
| CW # : | 1185-1 | 1185-2 |
| **COP NAME** | | |
| TCDD | BDL 0.67 ppt | BDL 1.0 ppt |
| 2378 TCDD | BDL 0.91 ppt | BDL 1.0 ppt |
| PeCDD | BDL 2.2 ppt | BDL 0.72 ppt |
| 12378 PeCDD | BDL 2.2 ppt | BDL 0.72 ppt |
| HxCDD | BDL 1.8 ppt | BDL 0.81 ppt |
| 123478 HxCDD | BDL 1.8 ppt | BDL 0.81 ppt |
| 123678 HxCDD | BDL 1.8 ppt | BDL 0.81 ppt |
| 123789 HxCDD | BDL 1.8 ppt | BDL 0.81 ppt |
| HpCDD | 9.0 ppt | BDL 0.83 ppt |
| 1234678 HpCDD | 5.9 ppt | BDL 0.83 ppt |
| OCDD | 46.9 ppt | BDL 2.6 ppt |

Table 5-24

Ground Water Round 2 Dibenzofuran Results

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | CW-1-S | CW-1-I | CW-1-D | CW-2-S | CW-2-I | CW-2-D | CW-2-D (DUP) |
| LAB ID #: | 185207 | 185211 | 185212 | 185139 | 185208 | 185214 | 185213 |
| GC/MS DATE: | 4-13-88 | 4-13-88 | 4-14-88 | 4-13-88 | 4-13-88 | 4-14-88 | 4-14-88 |
| GC/MS TIME: | 22:38 | 23:58 | 15:44 | 22:00 | 23:16 | 18:28 | 17:50 |
| CW # : | 1166-2 | 1166-4 | 1166-5 | 1166-1 | 1166-3 | 1166-7 | 1166-6RI |
| CDP NAME | | | | | | | |
| TCDF | BDL 0.19 ppt | BDL 0.31 ppt | BDL 0.27 ppt | BDL 0.25 ppt | BDL 0.24 ppt | BDL 0.47 ppt | BDL 0.49 ppt |
| 2378 TCDF | BDL 0.22 ppt | BDL 0.3 ppt | BDL 0.26 ppt | BDL 0.25 ppt | BDL 0.22 ppt | BDL 0.56 ppt | BDL 0.49 ppt |
| PeCDF | BDL 0.29 ppt | BDL 0.36 ppt | BDL 0.33 ppt | BDL 0.3 ppt | BDL 0.42 ppt | BDL 0.81 ppt | BDL 0.68 ppt |
| 12378 PeCDF | BDL 0.29 ppt | BDL 0.36 ppt | BDL 0.33 ppt | BDL 0.3 ppt | BDL 0.42 ppt | BDL 0.81 ppt | BDL 0.68 ppt |
| 23478 PeCDF | BDL 0.29 ppt | BDL 0.36 ppt | BDL 0.35 ppt | BDL 0.3 ppt | BDL 0.42 ppt | BDL 0.81 ppt | BDL 0.63 ppt |
| HxCDF | BDL 0.33 ppt | BDL 0.4 ppt | BDL 0.34 ppt | 2.4 ppt | BDL 0.33 ppt | BDL 0.69 ppt | BDL 0.63 ppt |
| 123478 HxCDF | BDL 0.33 ppt | BDL 0.4 ppt | BDL 0.34 ppt | BDL 0.31 ppt | BDL 0.33 ppt | BDL 0.69 ppt | BDL 0.63 ppt |
| 123678 HxCDF | BDL 0.33 ppt | BDL 0.4 ppt | BDL 0.34 ppt | BDL 0.31 ppt | BDL 0.33 ppt | BDL 0.69 ppt | BDL 0.63 ppt |
| 124678 HxCDF | BDL 0.33 ppt | BDL 0.4 ppt | BDL 0.34 ppt | BDL 0.31 ppt | BDL 0.33 ppt | BDL 0.69 ppt | BDL 0.63 ppt |
| 123789 HxCDF | BDL 0.33 ppt | BDL 0.4 ppt | BDL 0.34 ppt | BDL 0.31 ppt | BDL 0.33 ppt | BDL 0.69 ppt | BDL 0.63 ppt |
| HpCDF | BDL 0.6 ppt | BDL 0.8 ppt | BDL 0.48 ppt | 11.7 ppt | BDL 0.65 ppt | BDL 0.84 ppt | BDL 0.94 ppt |
| 1234678 HpCDF | BDL 0.6 ppt | BDL 0.8 ppt | BDL 0.49 ppt | 2.8 0.7 ppt | BDL 0.65 ppt | BDL 0.84 ppt | BDL 0.94 ppt |
| 1234789 HpCDF | BDL 0.6 ppt | BDL 0.8 ppt | BDL 0.49 ppt | BDL 0.34 ppt | BDL 0.55 ppt | BDL 0.84 ppt | BDL 0.94 ppt |
| OCDF | BDL 0.92 ppt | BDL 0.83 ppt | BDL 1.2 ppt | 22.0 ppt | 1.7 ppt | BDL 1.7 ppt | BDL 1.1 ppt |

Table 5-24 (Cont'd)

Table Water Round 2 Dibenzofuran Results

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | CW-3-S | CW-3-I | CW-3-D | CW-4-S | CW-4-I | CW-4-D | CW-5-S |
| LAB ID #: | 184239 | 184240 | 184238 | 184033 | 184037 | 184041 | 184306 |
| GC/MS DATE: | 4-09-88 | 4-09-88 | 4-09-88 | 4-08-88 | 4-08-88 | 4-08-88 | 4-04-88 |
| GC/MS TIME: | 12:06 | 12:44 | 11:27 | 14:35 | 11:43 | 16:31 | 15:15 |
| CW # : | 1161-3 | 1161-4 | 1161-2 | 1141-1 | 1141-3 | 1141-5 | 1141-2 |
| CDF NAME | | | | | | | |
| TCDF | BDL 0.088 ppt | BDL 0.22 ppt | BDL 0.088 ppt | BDL 0.099 ppt | BDL 0.091 ppt | BDL 0.047 ppt | BDL 0.091 ppt |
| 2378 TCDF | BDL 0.078 ppt | BDL 0.29 ppt | BDL 0.078 ppt | BDL 0.16 ppt | BDL 0.073 ppt | BDL 0.081 ppt | BDL 0.14 ppt |
| PeCDF | BDL 0.2 ppt | BDL 0.43 ppt | BDL 0.2 ppt | BDL 0.2 ppt | BDL 0.2 ppt | BDL 0.12 ppt | BDL 0.18 ppt |
| 12378 PeCDF | BDL 0.2 ppt | BDL 0.36 ppt | BDL 0.2 ppt | BDL 0.2 ppt | BDL 0.2 ppt | BDL 0.12 ppt | BDL 0.18 ppt |
| 23478 PeCDF | BDL 0.2 ppt | BDL 0.36 ppt | BDL 0.2 ppt | BDL 0.2 ppt | BDL 0.2 ppt | BDL 0.12 ppt | BDL 0.18 ppt |
| HxCDF | BDL 0.29 ppt | BDL 0.67 ppt | BDL 0.29 ppt | BDL 0.18 ppt | BDL 0.2 ppt | BDL 0.14 ppt | BDL 0.18 ppt |
| 123478 HxCDF | BDL 0.28 ppt | BDL 0.67 ppt | BDL 0.28 ppt | BDL 0.18 ppt | BDL 0.2 ppt | BDL 0.14 ppt | BDL 0.18 ppt |
| 123678 HxCDF | BDL 0.28 ppt | BDL 0.67 ppt | BDL 0.28 ppt | BDL 0.18 ppt | BDL 0.2 ppt | BDL 0.14 ppt | BDL 0.18 ppt |
| 124678 HxCDF | BDL 0.28 ppt | BDL 0.67 ppt | BDL 0.28 ppt | BDL 0.18 ppt | BDL 0.2 ppt | BDL 0.14 ppt | BDL 0.18 ppt |
| 123789 HxCDF | BDL 0.28 ppt | BDL 0.67 ppt | BDL 0.28 ppt | BDL 0.18 ppt | BDL 0.2 ppt | BDL 0.14 ppt | BDL 0.18 ppt |
| HpCDF | BDL 0.6 ppt | BDL 1.8 ppt | BDL 0.6 ppt | BDL 0.46 ppt | BDL 0.57 ppt | BDL 0.36 ppt | 0.93 ppt |
| 1234678 HpCDF | BDL 0.6 ppt | BDL 1.9 ppt | BDL 0.6 ppt | BDL 0.46 ppt | BDL 0.57 ppt | BDL 0.36 ppt | BDL 0.43 ppt |
| 1234789 HpCDF | BDL 0.6 ppt | BDL 1.9 ppt | BDL 0.6 ppt | BDL 0.46 ppt | BDL 0.57 ppt | BDL 0.36 ppt | BDL 0.43 ppt |
| OCDF | BDL 0.66 ppt | BDL 1.7 ppt | BDL 0.66 ppt | BDL 1.4 ppt | BDL 0.41 ppt | BDL 0.38 ppt | 1.4 ppt |

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Table 5-24 (Cont'd)

Ground Water Round 2 Dibenzofuran Results

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| POINT: | CW-5-I | CW-5-D | CW-6-S | CW-6-I | CW-6-D | HAV-2 | HAV-5 |
| LAB ID #: | 184040 | 184042 | 184716 | 184713 | 184235 | 184241 | 184242 |
| GC/MS DATE: | 4-08-88 | 4-08-88 | 4-13-88 | 4-13-88 | 4-09-88 | 4-09-88 | 4-09-88 |
| GC/MS TIME: | 15:53 | 17:14 | 19:24 | 17:28 | 10:50 | 13:22 | 14:00 |
| CW # : | 1141-4 | 1141-6 | 1163-2 | 1163-1 | 1161-1 | 1161-5 | 1161-6 |
| CDP NAME | | | | | | | |
| TCDF | BDL 0.1 ppt | BDL 0.077 ppt | BDL 0.12 ppt | BDL 0.15 ppt | BDL 0.14 ppt | BDL 0.25 ppt | BDL 0.17 ppt |
| 2378 TCDF | BDL 0.12 ppt | BDL 0.079 ppt | BDL 0.21 ppt | BDL 0.15 ppt | BDL 0.15 ppt | BDL 0.21 ppt | BDL 0.16 ppt |
| PeCDF | BDL 0.18 ppt | BDL 0.15 ppt | BDL 0.16 ppt | BDL 0.22 ppt | BDL 0.33 ppt | BDL 0.35 ppt | BDL 0.26 ppt |
| 12378 PeCDF | BDL 0.18 ppt | BDL 0.15 ppt | BDL 0.16 ppt | BDL 0.22 ppt | BDL 0.33 ppt | BDL 0.4 ppt | BDL 0.32 ppt |
| 23478 PeCDF | BDL 0.18 ppt | BDL 0.15 ppt | BDL 0.16 ppt | BDL 0.22 ppt | BDL 0.33 ppt | BDL 0.4 ppt | BDL 0.32 ppt |
| HxCDF | BDL 0.21 ppt | BDL 0.19 ppt | BDL 0.2 ppt | BDL 0.21 ppt | BDL 0.47 ppt | 2.5 ppt | BDL 0.32 ppt |
| 123478 HxCDF | BDL 0.21 ppt | BDL 0.19 ppt | BDL 0.2 ppt | BDL 0.21 ppt | BDL 0.47 ppt | BDL 0.5 ppt | BDL 0.31 ppt |
| 123678 HxCDF | BDL 0.21 ppt | BDL 0.19 ppt | BDL 0.2 ppt | BDL 0.21 ppt | BDL 0.47 ppt | BDL 0.5 ppt | BDL 0.31 ppt |
| 124678 HxCDF | BDL 0.21 ppt | BDL 0.19 ppt | BDL 0.2 ppt | BDL 0.21 ppt | BDL 0.47 ppt | BDL 0.5 ppt | BDL 0.31 ppt |
| 123789 HxCDF | BDL 0.21 ppt | BDL 0.19 ppt | BDL 0.2 ppt | BDL 0.21 ppt | BDL 0.47 ppt | BDL 0.5 ppt | BDL 0.31 ppt |
| HpCDF | BDL 0.64 ppt | BDL 0.44 ppt | BDL 0.39 ppt | BDL 0.45 ppt | BDL 1.2 ppt | 24.8 ppt | BDL 0.65 ppt |
| 1234678 HpCDF | BDL 0.64 ppt | BDL 0.44 ppt | BDL 0.39 ppt | BDL 0.45 ppt | BDL 1.2 ppt | 4.7 ppt | BDL 0.72 ppt |
| 1234789 HpCDF | BDL 0.64 ppt | BDL 0.44 ppt | BDL 0.39 ppt | BDL 0.45 ppt | BDL 1.2 ppt | BDL 1.1 ppt | BDL 0.72 ppt |
| OCDF | BDL 0.66 ppt | BDL 0.56 ppt | BDL 0.5 ppt | BDL 0.62 ppt | BDL 1.2 ppt | 42.3 ppt | BDL 0.7 ppt |

Table 5-24 (Cont'd)

Ground Water Round 2 Dibenzofuran Results

| SITE: | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
|---|---|---|---|---|---|---|---|
| POINT: | HAV-7 | HAV-8 | MW-1 | MW-1(DUP) | MW-2 | MW-3 | MW-6 |
| LAB ID #: | 184043 | 184044 | 184717RX | 184718RX | 185397 | 185398 | 185399 |
| GC/MS DATE: | 4-08-88 | 4-08-88 | 4-15-88 | 4-15-88 | 4-14-88 | 4-14-88 | 4-14-88 |
| GC/MS TIME: | 17:52 | 18:30 | 11:38 | 12:19 | 19:06 | 19:44 | 20:22 |
| CW # : | 1141-7 | 1141-8 | 1163-3RX | 1163-4RX | 1179-1 | 1179-2 | 1179-3 |
| CDP NAME | | | | | | | |
| TCDF | BDL 0.082 ppt | BDL 0.11 ppt | BDL 10.7 ppt | BDL 12.3 ppt | BDL 0.39 ppt | BDL 0.38 ppt | BDL 0.47 ppt |
| 2378 TCDF | BDL 0.091 ppt | BDL 0.11 ppt | BDL 12.1 ppt | BDL 12.6 ppt | BDL 0.39 ppt | BDL 0.38 ppt | BDL 0.47 ppt |
| PeCDF | BDL 0.16 ppt | BDL 0.22 ppt | BDL 8.4 ppt | BDL 11.2 ppt | BDL 0.48 ppt | BDL 0.41 ppt | BDL 0.63 ppt |
| 12378 PeCDF | BDL 0.16 ppt | BDL 0.22 ppt | BDL 9.6 ppt | BDL 11.2 ppt | BDL 0.48 ppt | BDL 0.41 ppt | BDL 0.63 ppt |
| 23478 PeCDF | BDL 0.16 ppt | BDL 0.22 ppt | BDL 9.6 ppt | BDL 11.2 ppt | BDL 0.48 ppt | BDL 0.41 ppt | BDL 0.63 ppt |
| HxCDF | BDL 0.16 ppt | BDL 0.25 ppt | BDL 17.7 ppt | 41.6 ppt | BDL 0.45 ppt | BDL 0.53 ppt | BDL 0.68 ppt |
| 123478 HxCDF | BDL 0.18 ppt | BDL 0.25 ppt | BDL 17.7 ppt | BDL 25.6 ppt | BDL 0.45 ppt | BDL 0.53 ppt | BDL 0.68 ppt |
| 123678 HxCDF | BDL 0.18 ppt | BDL 0.25 ppt | BDL 17.7 ppt | BDL 25.6 ppt | BDL 0.45 ppt | BDL 0.53 ppt | BDL 0.68 ppt |
| 124678 HxCDF | BDL 0.18 ppt | BDL 0.25 ppt | BDL 17.7 ppt | BDL 25.6 ppt | BDL 0.45 ppt | BDL 0.53 ppt | BDL 0.68 ppt |
| 123789 HxCDF | BDL 0.18 ppt | BDL 0.25 ppt | BDL 19.6 ppt | BDL 25.6 ppt | BDL 0.45 ppt | BDL 0.53 ppt | BDL 0.68 ppt |
| HpCDF | BDL 0.058 ppt | BDL 0.58 ppt | 1220 ppt | 643 ppt | 3.2 ppt | BDL 0.77 ppt | BDL 0.9 ppt |
| 1234678 HpCDF | BDL 0.058 ppt | BDL 0.58 ppt | 180 ppt | 88.6 ppt | BDL 0.9 ppt | BDL 0.77 ppt | BDL 0.9 ppt |
| 1234789 HpCDF | BDL 0.058 ppt | BDL 0.58 ppt | BDL 27.1 ppt | BDL 20.4 ppt | BDL 0.9 ppt | BDL 0.77 ppt | BDL 0.9 ppt |
| OCDF | BDL 0.6 ppt | BDL 0.67 ppt | 2964 ppt | 1564 ppt | 6.6 ppt | BDL 1.1 ppt | BDL 1.1 ppt |

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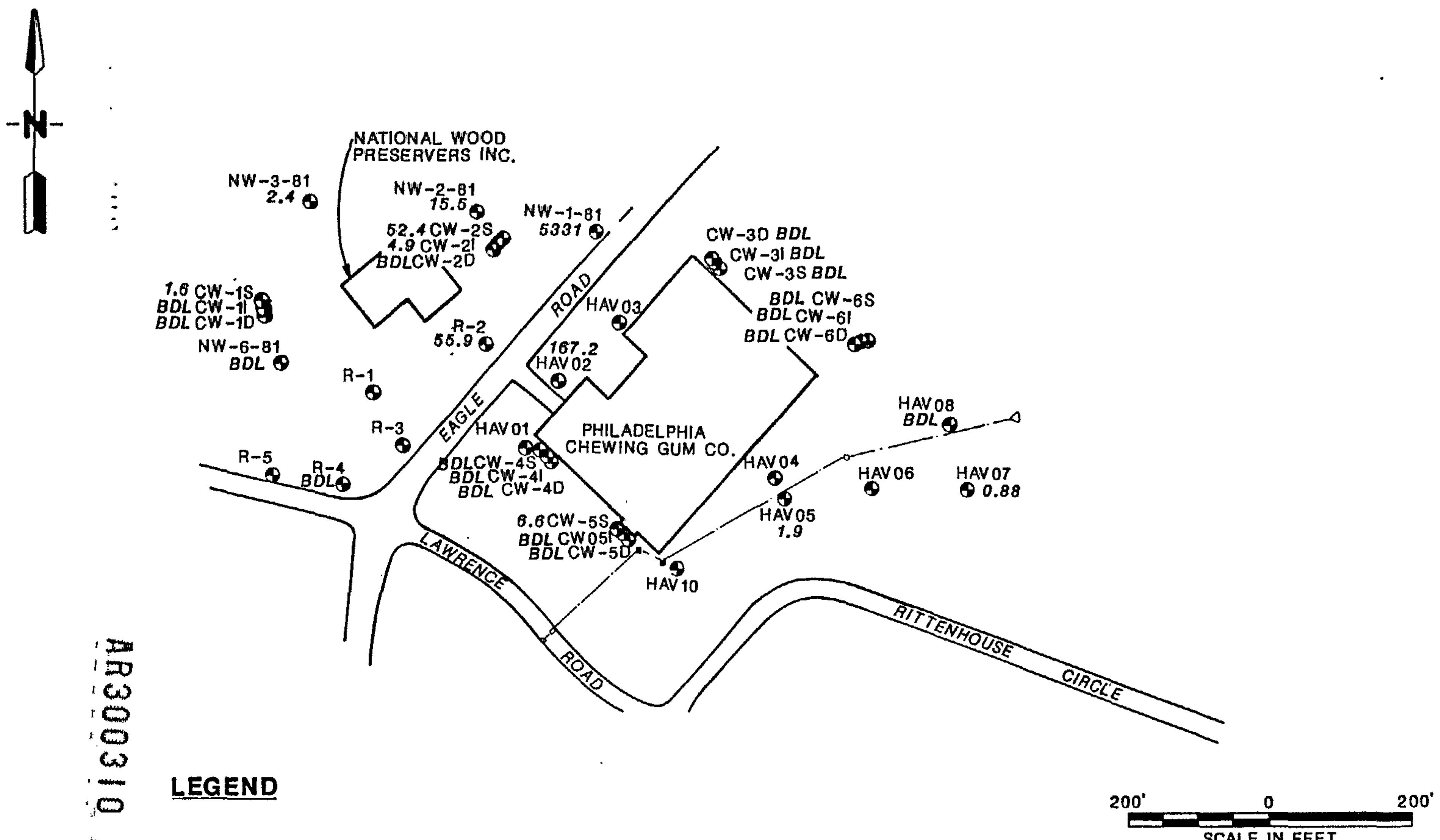
Table 5-24 (Cont'd)

Ground Water Round 2 Dibenzofuran Results

| | | |
|---|---|---|
| SITE: | 86021 | 86021 |
| POINT: | R-2 | R-4 |
| LAB ID #: | 185706 | 185709 |
| GC/MS DATE: | 4-14-88 | 4-14-88 |
| GC/MS TIME: | 20:59 | 21:36 |
| CW # : | 1185-1 | 1185-2 |
| COP NAME | | |
| TCDF | BDL 0.53 ppt | BDL 0.38 ppt |
| 2378 TCDF | BDL 0.75 ppt | BDL 0.36 ppt |
| PeCDF | BDL 0.75 ppt | BDL 0.43 ppt |
| 12378 PeCDF | BDL 0.75 ppt | BDL 0.43 ppt |
| 23478 PeCDF | BDL 0.75 ppt | BDL 0.43 ppt |
| HxCDF | BDL 0.83 ppt | BDL 0.48 ppt |
| 123478 HxCDF | BDL 0.83 ppt | BDL 0.48 ppt |
| 123678 HxCDF | BDL 0.83 ppt | BDL 0.48 ppt |
| 124678 HxCDF | BDL 0.83 ppt | BDL 0.48 ppt |
| 123789 HxCDF | BDL 0.83 ppt | BDL 0.48 ppt |
| HpCDF | 8.2 ppt | BDL 0.56 ppt |
| 1234678 HpCDF | 1.9 ppt | BDL 0.56 ppt |
| 1234789 HpCDF | BDL 1.2 ppt | BDL 0.56 ppt |
| OCDF | 14.4 ppt | BDL 0.97 ppt |




## LEGEND

| | |
|---|---|
| ⊕ | EXISTING WELL LOCATIONS |
| — · — | STORM SEWER |
| *BDL* | BELOW DETECTION LIMIT |
| CW | LOCATION OF NEW MONITORING WELLS |

**FIGURE 5-22**

**HAVERTOWN PCP SITE**
HAVERTOWN, PA

TOTAL DIOXIN ISOMERS (ppt)
GROUNDWATER-ROUND 2

| | | |
|---|---|---|
| drawn CCS | approved JNW | drawing no. |
| checked JST | date 5-20-88 | 86021-023-AA |

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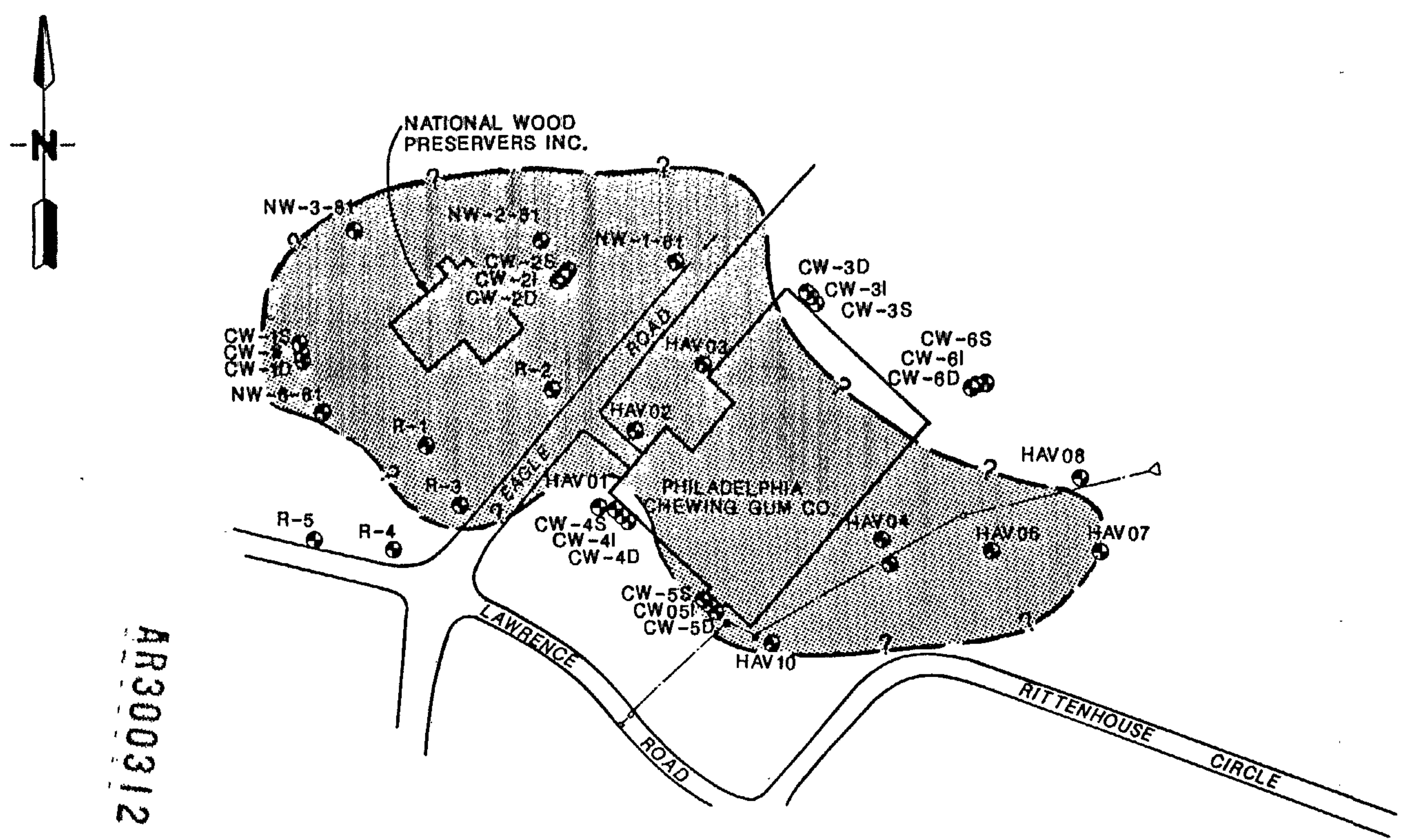
earth resource consultants

AR300310

groundwater derived from wells with contaminated oil in them do not necessarily have the highest dissolved dioxin concentrations.

Dioxin data from the newly installed monitoring wells indicated that dioxin was not detected in the bedrock wells at these locations. Based upon the data at this time, the dioxin contamination appears to be present only in the shallow and some intermediate-depth cluster wells, which are geologically situated in the saprolite units. From this sampling round (round #2) and the preliminary sampling round (round #1) data, an estimation of the groundwater contaminated by dioxin has been made. The shaded area of Figure 5-23 represents the estimated shallow groundwater area affected by contamination from dioxin. Note that the contamination appears to extend beyond the present monitoring well network. For example, relatively elevated quantities of dioxin exist in the groundwater at NW-1-81. Additionally, wells HAV-05, HAV-07, and HAV-10 indicate that dioxin contamination in the groundwater extends downgradient of the storm sewer and past the present monitoring well network.

It was originally believed that the presence of dioxin in the groundwater samples was the result of dioxin adhering to fine sediments in the water samples which were analyzed. As dioxin has a very low solubility, this would seem to account for its presence in the water. However, this does not appear to be the case as no correlation between dioxin concentration and observed turbidity could be found. Therefore, the dioxin detected by the analysis appears to be the result of small amounts of dissolved oil which may be present in the water samples, which went undetected because of the detection levels of the other analytes.






## LEGEND

| | |
|---|---|
| ⊕ | EXISTING WELL LOCATIONS |
| —·— | STORM SEWER |
| CW | LOCATION OF NEW MONITORING WELLS |
| | ESTIMATED AREA OF DIOXIN CONTAMINATION |

200' 0 200'

SCALE IN FEET

**FIGURE 5-23**

**HAVERTOWN PCP SITE**

**HAVERTOWN, PA**

**ESTIMATED DIOXIN CONTAMINATION IN GROUNDWATER**

| | | |
|---|---|---|
| drawn CCS | approved JNW | drawing no. |
| checked JST | date 5-20-88 | 86021-025-AA |

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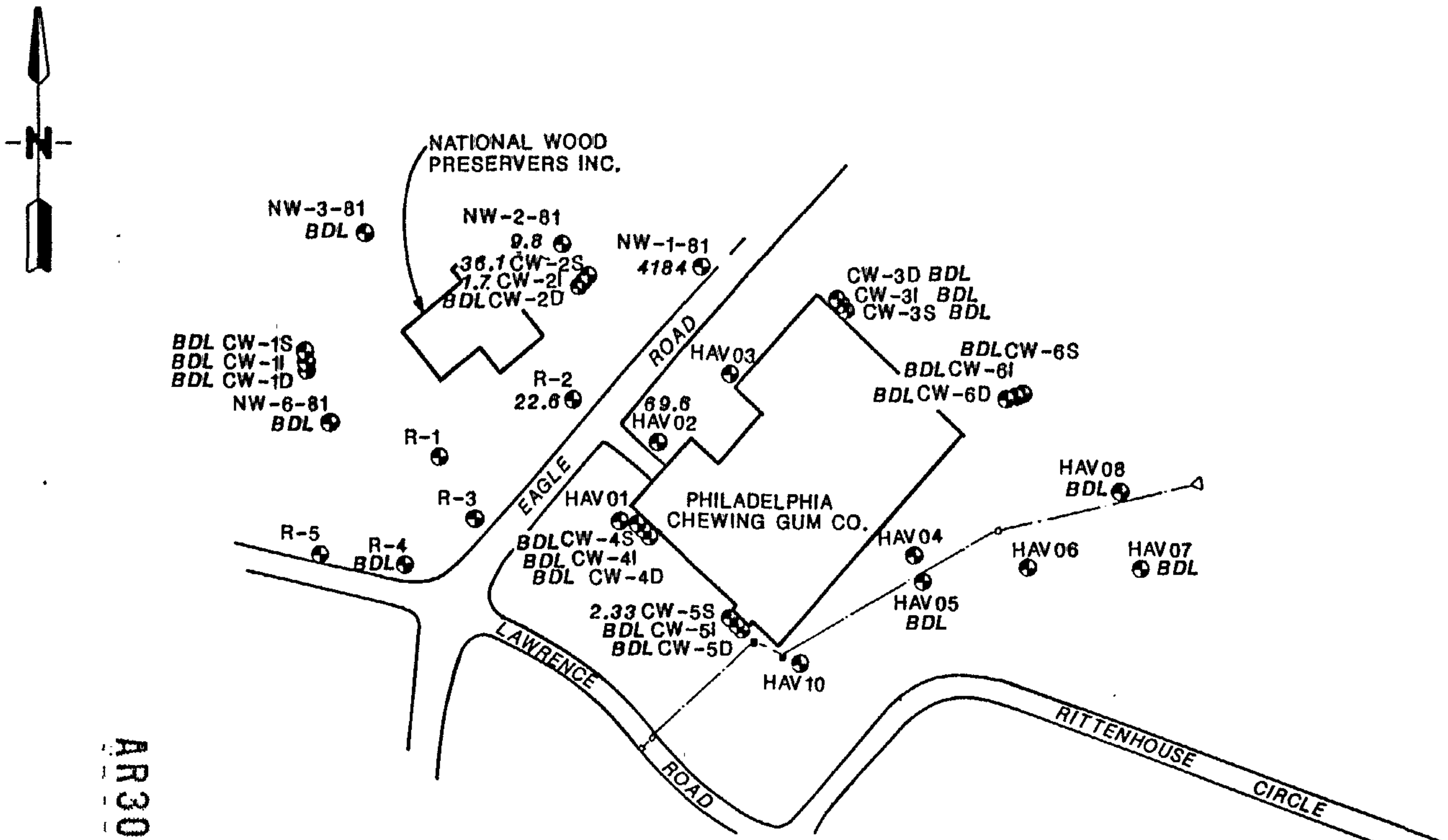
earth resource consultants
middletown pennsylvania

Dibenzofuran isomers were identified in the groundwater samples from round #2 and consisted primarily of octa-, hepta-, and some amounts of hexa-chlorinated dibenzofurans. Figure 5-24 depicts the distribution of total dibenzofuran isomers in the groundwater samples from round #2. Levels of total dibenzofuran were elevated in wells R-2 and HAV-02 (22.6 and 69.6 ppt, respectively), with a significant level of dibenzofuran present in NW-1-81 (4184 ppt). This pattern is similar to the total dioxin concentrations discussed previously. Small amounts of dibenzofuran were identified in NW-2-81 (9.8 ppt) and in CW-5S (2.33 ppt). With the exception of one location, NW-1-81, and possibly at HAV-10 (not sampled), it would appear that the presence of dibenzofuran is within the confines of the present monitoring well network. Although not certain, it would appear that the dibenzofurans are present in the saprolite units as are the dioxins. The presence of dioxin and dibenzofuran isomers was not identified in known bedrock monitoring wells.

No correlation appears to exist between the presence of oil in a well and high dibenzofuran levels. Likewise, no correlation exists between observed turbidity and dibenzofuran contamination.

### 5.3.6 Affected Area

5.3.6.1 Immiscible Hydrocarbon Plume - Beginning as early as 1953 with the initial reports of pollution in Naylors Run, the focus of contamination at the Havertown PCP site has been on a subsurface oil plume. Using measurements of oil thicknesses in their wells, previous investigators constructed an oil thickness map for the Havertown PCP site. The oil plume was identified as having an elliptical shape whose major axis was parallel to the easterly groundwater flow direction. By estimating a porosity




AR300314

## LEGEND

| | |
|---|---|
| ⊕ | EXISTING WELL LOCATIONS |
| — · — | STORM SEWER |
| *BDL* | BELOW DETECTION LIMIT |
| CW | LOCATION OF NEW MONITORING WELLS |

200' 0 200'

SCALE IN FEET

**FIGURE 5-24**

**HAVERTOWN PCP SITE**

**HAVERTOWN, PA**

**TOTAL DIBENZOFURAN ISOMERS (ppt)**

**GROUNDWATER ROUND 2**

| | | |
|---|---|---|
| drawn CCS | approved JNW | drawing no. |
| checked JST | date 5-20-88 | 86021-026-AA |

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earth resourc... ultants
middletown pennsylvania

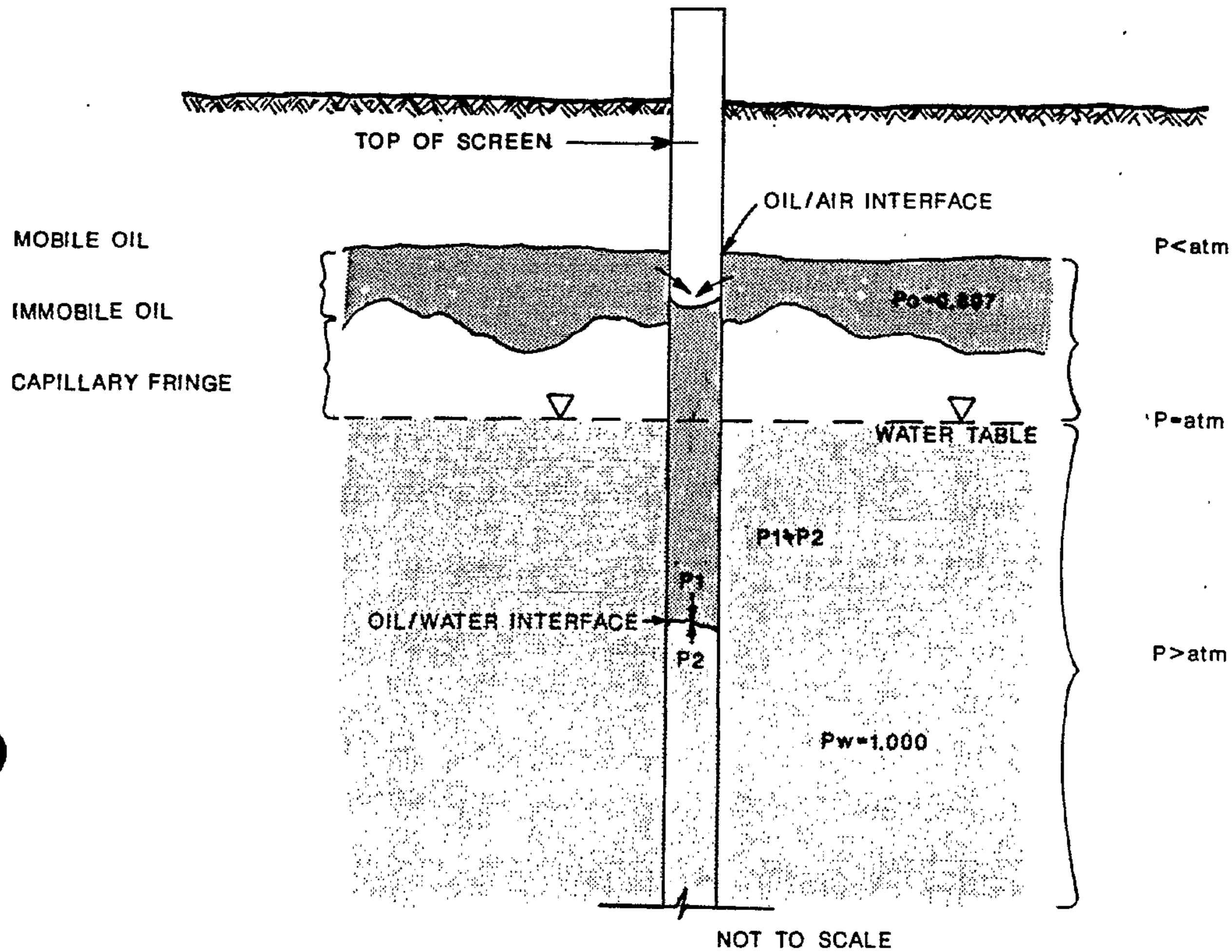
(15 to 25 percent) and calculating an approximate area (4.5 acres), the volume of oil in the subsurface was projected to range between 350,000 to 600,000 gallons.

Since these initial investigations at the Havertown PCP site, new methods of using oil thickness measurements in monitoring wells to estimate the quantity of oil on the water table surface have been developed. According to Blake and Hall (1984), the thickness of oil which is measured in a monitoring well does not represent the amount of oil present in the surrounding aquifer. Rather, the measured oil thickness in the monitoring well will be substantially greater than the actual oil thickness in the formation.

In unconsolidated water table aquifers, the well thickness error can be explained by the method of oil migration in the aquifer. Because of the difference in the specific gravities and the interfacial forces between the two immiscible fluids (oil and water), the oil will eventually position itself along the upper contact of the capillary fringe. When a monitoring well enters the groundwater table, the capillary fringe, formed by the molecular attraction between soil particles and water, is removed. The water surface which then forms, and is measured, in a monitoring well is the level in the soil where the water (fluid) pressure equals atmospheric pressure (i.e. the water table). Therefore, when the oil positions itself on top of the capillary fringe, it attains a more elevated position in the formation, with respect to the water level in the monitoring well and will enter the well until the thickness of oil in the well creates pressure great enough to overcome the entry pressure of the oil. In addition, the oil will depress the water surface in the well until the buoyant force counters the weight of the hydrocarbon, as shown by Figure 5-25.

Based on experiments by Blake and Hall (1984), an estimate of the true oil thickness on the aquifer may be obtained by measuring the apparent thickness of oil in the well (AT) and subtracting from it the calculated thickness of oil in the well below the water table and the height of the capillary fringe.

This procedure was used to estimate the oil thickness on the aquifer in the vicinity of monitoring well R-2. From REWAI's water and oil level measurements taken on March 17, 1988, the elevations for the oil/air interface and the oil/water interface were determined. Using the specific gravity of the oil, the corrected water table elevation was calculated as described in Section 5.3.4.4.1. Referring to Figure 5-26, the apparent thickness of oil in the well (AT) was calculated by determining the difference between the elevations of the oil/air interface and the oil/water interface (4.1 feet). The thickness of oil below the corrected water table (Twt) was then determined (3.68 feet) and subtracted from the AT yielding the thickness of the capillary fringe plus the mobile and immobile oil (0.42 feet). In order to provide an estimate of the oil thickness present on the aquifer in the vicinity of R-2, a capillary fringe thickness was estimated based on fine sand soil texture from Fetter, 1980 (0.25 feet). Subtracting the estimated capillary fringe height (0.25 feet) from the capillary fringe plus the mobile and immobile oil thickness (0.42 feet) yields an estimate of the oil present on the aquifer at R-2 of 0.17 feet or 2 inches. It must be stressed that this result is only an




## LEGEND

| | |
|---|---|
| P | PRESSURE, GREATER, EQUAL TO, OR LESS THAN ATMOSPHERIC |
| Po | FLUID DENSITY, OIL |
| Pw | FLUID DENSITY, WATER |
| P1 | FLUID PRESSURE OF OIL |
| P2 | FLUID PRESSURE OF WATER |
| P1≠P2 | FLUID PRESSURE EQUILIBRIUM NOT ESTABLISHED |
| ▽ | WATER TABLE |

( AFTER BLAKE AND HALL, 1984 )

**FIGURE 5-25**

**HAVERTOWN PCP SITE**
HAVERTOWN, PA

**OIL MOVEMENT INTO MONITORING WELL**

| | | |
|---|---|---|
| drawn S.S | approved JNW | drawing no. |
| checked JST | date 5-6-88 | 86021-019-AA |

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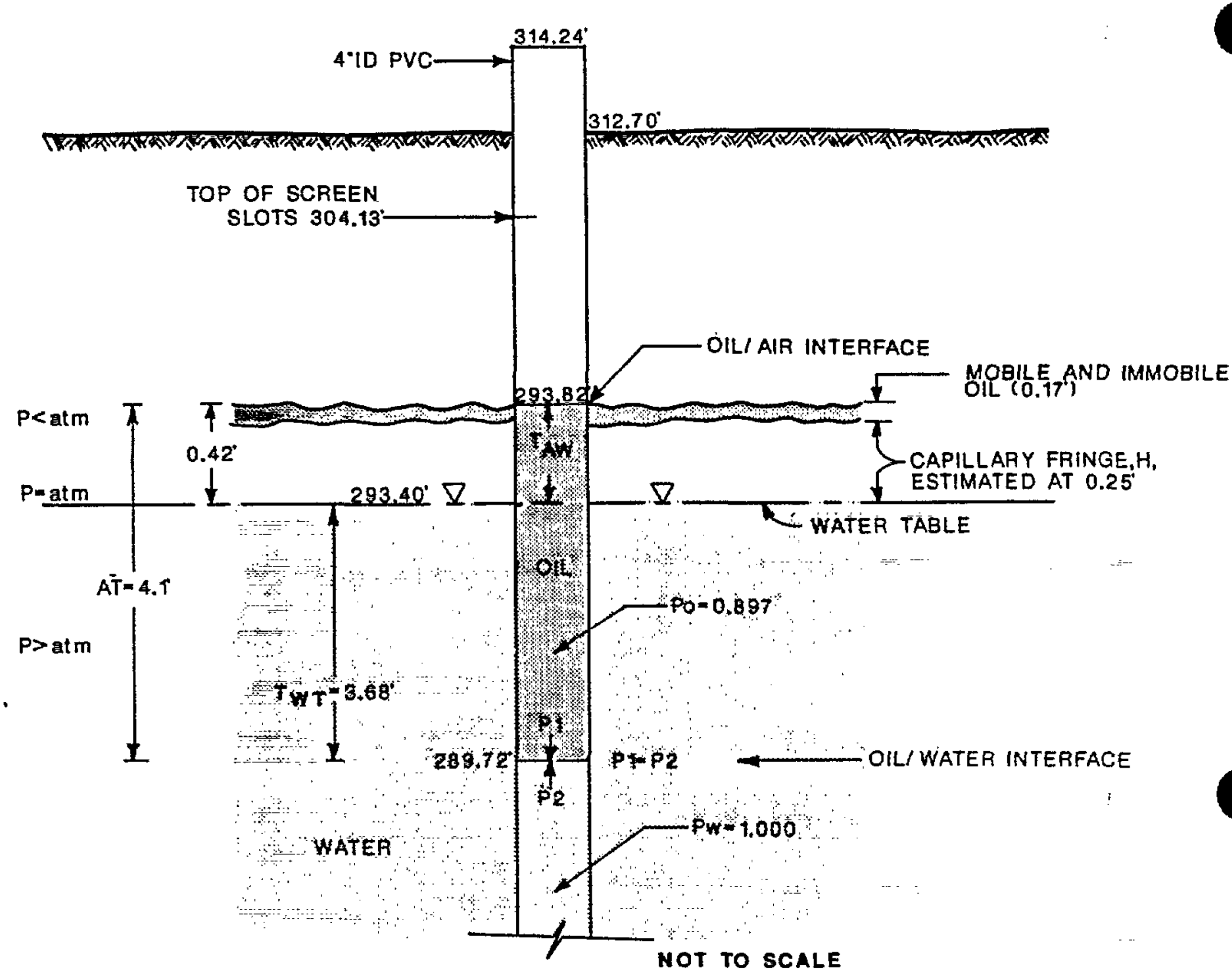
middletown pennsylvania

AR300317

# MONITORING WELL R-2




## LEGEND

AT APPARENT OIL THICKNESS IN MONITORING WELL (FEET)

atm ATMOSPHERIC

H HEIGHT OF CAPILLARY FRINGE (FEET) ESTIMATED BASED ON SOIL TEXTURE (FETTER,1980)

$T_{WT}$ THICKNESS OF OIL BELOW WATER TABLE

$T_{AW}$ THICKNESS OF OIL ABOVE WATER TABLE $T_{AW} = AT(1-Po)$

Po FLUID DENSITY,OIL

Pw FLUID DENSITY,WATER

P1 PRESSURE,OIL

Pa PRESSURE,WATER

Patm PRESSURE,ATMOSPHERIC

(AFTER BLAKE AND HALL,1984)

FIGURE 5-26

HAVERTOWN PCP SITE
HAVERTOWN, PA.

ESTIMATED OIL THICKNESS CALCULATION (3/17/88 DATA)

| drawn RBS | approved JNW | drawing no. 86021-018-AA |
|---|---|---|
| checked JST | date 5-4-88 | |

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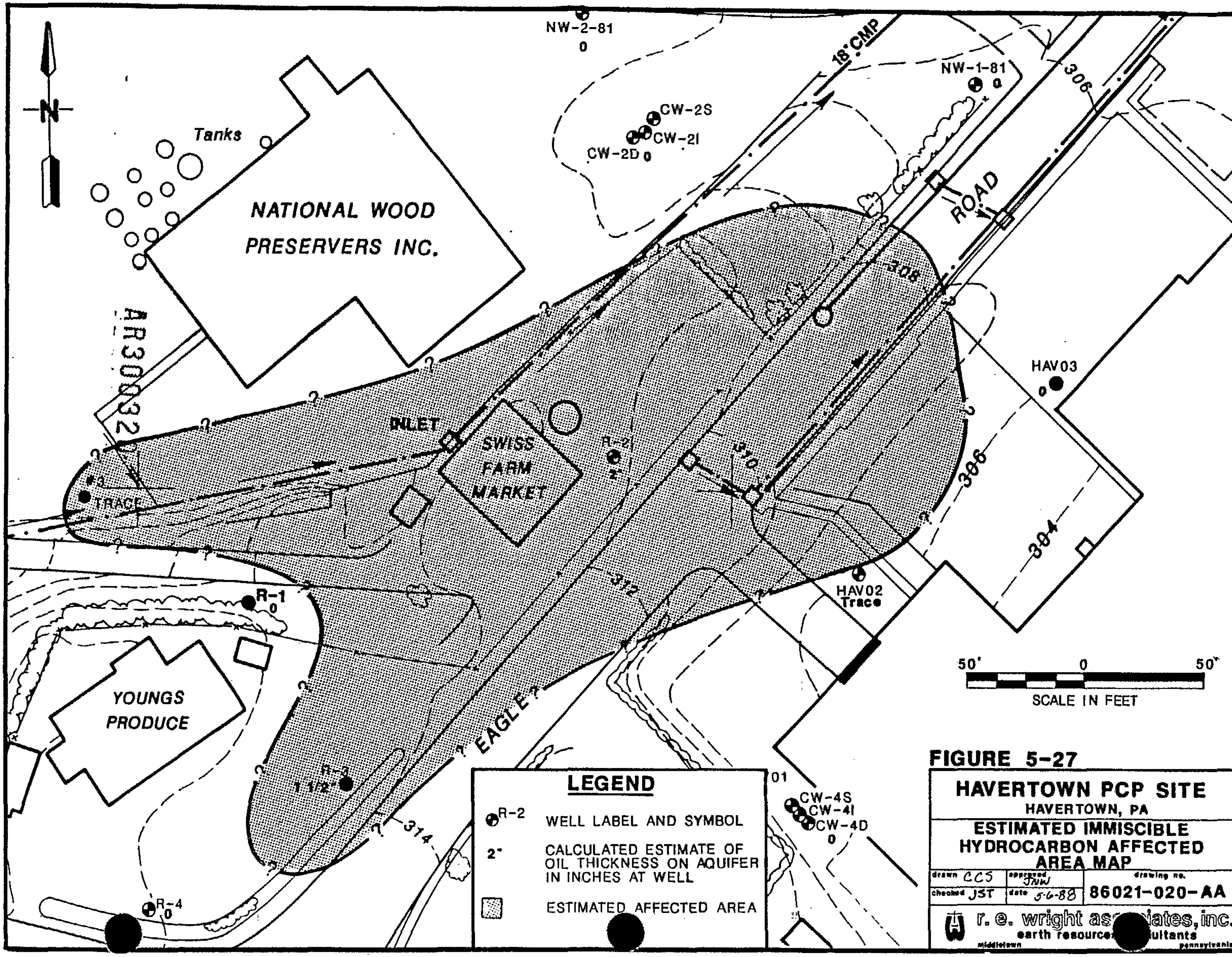
T03440-6021

approximation. Without knowing the height of the capillary fringe, a refined estimate of oil thickness cannot be made.

It is important to note that the measured thickness of oil in a well at the Havertown PCP site does not in itself reflect the extent of oil contamination on the water table. Therefore, by correcting for the actual thickness of oil in the aquifer, it is clear that the potential for free-floating immiscible oil which may be present in the subsurface is significantly less than the 350,000- to 600,000-gallon estimate from previous investigations.

To demonstrate this, the amount of free-floating immiscible oil has been estimated using Figure 5-27, which is a plot of the estimated boundary of the immiscible hydrocarbon plume and calculated aquifer oil thicknesses at spot locations. The affected area in this figure has been estimated to be approximately 45,000 square feet, or about 1.03 acres. If an average oil thickness of 0.083 feet (1 inch) is assumed to be present over the affected area, and an estimated porosity of 21 percent, previously presented in Table 5-12, the estimated amount of free-floating immiscible oil would be approximately 6,000 gallons. Because the highly irregular capillary fringe would tend to alter the thickness of the oil plume significantly, making an "average" value difficult to arrive at, the reliability of the 6,000-gallon estimate is undetermined. However, this assessment clearly indicates that substantially less free-floating immiscible oil is present at Havertown than previously believed.

As no determination of the amount of oil which has adhered to the soil grains within the zone of water table fluctuation has been made, no estimate of the oil immobilized in this area has been


N
Tanks
NATIONAL WOOD
PRESERVERS INC.
NW-2-81
0
18" CMP
NW-1-81
0
CW-2S
CW-2I
CW-2D 0
306
ROAD
308
INLET
SWISS
FARM
MARKET
R-2
2"
310
HAV03
0
306
304
#3
TRACE
R-1
0
312
HAV02
Trace
YOUNGS
PRODUCE
EAGLE
R-3
1 1/2"
314
R-4
0
01
CW-4S
CW-4I
CW-4D
0
50' 0 50'
SCALE IN FEET
LEGEND
R-2 WELL LABEL AND SYMBOL
2" CALCULATED ESTIMATE OF OIL THICKNESS ON AQUIFER IN INCHES AT WELL
ESTIMATED AFFECTED AREA
FIGURE 5-27
HAVERTOWN PCP SITE
HAVERTOWN, PA
ESTIMATED IMMISCIBLE
HYDROCARBON AFFECTED
AREA MAP
drawn CCS
approved JNW
drawing no.
checked JST
date 5-6-88
86021-020-AA
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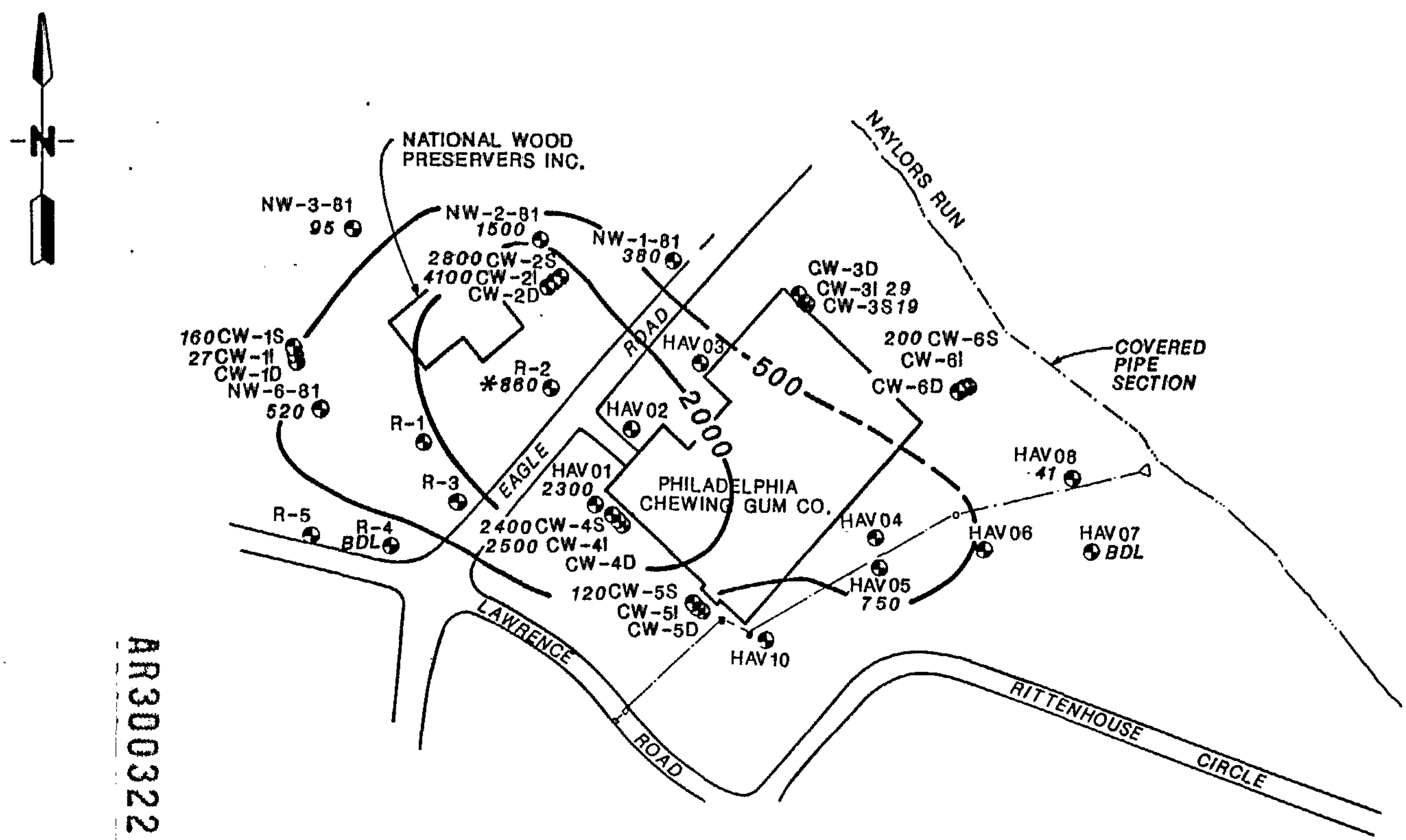
middletown pennsylvania

made. The amount could be considerable based upon past REWAI experience and should be addressed during site remediation planning.

5.3.6.2 Dissolved Hydrocarbon Plume - As described in Section 5.3.5, water-soluble chemical contaminants have been identified in the groundwater at the Havertown PCP site. The contaminants apparently originate from sources of gasoline/fuel oil and solvents/degreasers.

A review of the gasoline/fuel oil component concentrations in the groundwater indicates that the most probable contaminant source is from the subsurface waste fuel oil residing on the surface of the water table. Since the fuel oil was originally used at NWP prior to its disposal, the presence of pentachlorophenol (PCP) in the oil, as a preservative, would allow it to be used to trace the extent of groundwater contamination from dissolved chemicals. The use of PCP as a positive indicator of the dissolved contaminant plume, however, would yield a conservative depiction of the affected area because of, among others, the relatively low solubility of PCP in water (14 mg/l) and the relatively high PCP detection limit (50 ug/l), compared to other compounds reported.

Figure 5-28 depicts the dissolved PCP concentration in the groundwater in the saprolite units. As shown by the figure, 500 and 2000 ug/l PCP concentration lines were drawn to provide a rough approximation of the shape of the dissolved plume. It appears that the higher concentrations of dissolved PCP in the saprolite units occur between the NWP and PCG buildings and that the concentration of this species apparently rapidly decreases laterally with distance from this area. It is important to note that the reported concentration of PCP at well R-2 (600 ug/l) was




AR300322

## LEGEND

| | |
|---|---|
| ⊕ | EXISTING WELL LOCATIONS |
| —·— | STORM SEWER |
| —500— | ESTIMATED LOCATION OF PCP CONCENTRATON CONTOUR (ug/l) |
| BDL | BELOW DETECTION LIMIT |
| * | BELIEVED TO BE GREATER: CHEMICAL INTERFERENCE DURING ANALYSIS |

200' 0 200'
SCALE IN FEET

**FIGURE 5-28**

**HAVERTOWN PCP SITE**
**HAVERTOWN, PA**

**PENTACHLOROPHENOL CONCENTRATION MAP (ug/l) SAPROLITE UNITS GROUNDWATER ROUND 2**

| | | |
|---|---|---|
| drawn CCS | approved JNH | drawing no. 86021-039-AA |
| checked JST | date 5-24-88 | |

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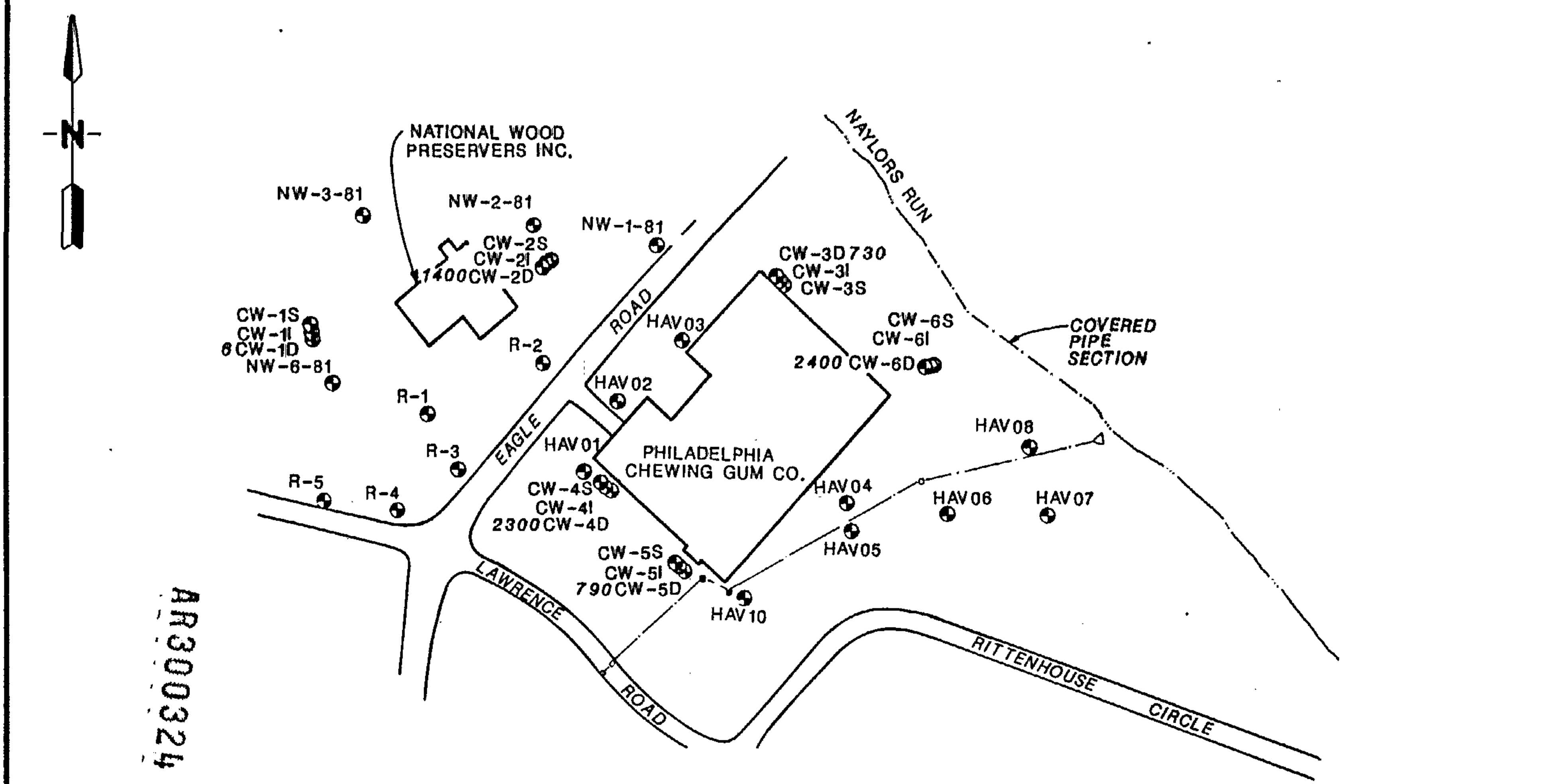
diluted 80 times and analyzed 37 days after extraction, which is within the EPA requirement of 40 days for analysis. Smaller dilutions, completed earlier, reported substantially higher PCP concentrations--namely, 5800+, 3400+, and 2700+ ug/l. Because of the high concentrations of PCP found, the interference of other chemicals, the number of dilutions required, and the instability of PCP, it is believed that this reported number (860 ug/l) is understated and not representative of the PCP concentration in the groundwater at R-2, even though proper QA/QC procedures had been used. Consequently, the 2,000 ug/l PCP isocon enshrouds well R-2.

It is apparent that dissolved PCP extends beyond the present monitoring well network, as evidenced at monitoring well HAV-05. The shape of the dissolved plume, as indicated by PCP, is elongated in the direction of groundwater flow, east-southeast. In addition, highest groundwater concentrations of dissolved PCP appear to be related to the location of the subsurface fuel oil plume, as shown previously in Figure 5-27.

A similar dissolved PCP map was produced for groundwater in the bedrock. As shown by Figure 5-29, the six CW-series bedrock monitoring wells indicate that dissolved PCP levels are significantly elevated at the NWP and PCG sites. Because of the limited number of data points, no approximation of the extent of the dissolved PCP plume in bedrock was made by contouring. However, it appears that the PCP dissolved in the bedrock groundwater also extends beyond the present monitoring well network, as evidenced by well CW-6D, the furthest downgradient deep monitoring well.




LEGEND

EXISTING WELL LOCATIONS

STORM SEWER

FIGURE 5-29

HAVERTOWN PCP SITE
HAVERTOWN, PA

PENTACHLOROPHENOL
CONCENTRATION MAP (ug/l)
BEDROCK
GROUNDWATER ROUND 2

| | | |
|---|---|---|
| drawn CCS | approved JHW | drawing no. |
| checked JST | date 5-26-88 | 86021-040-AA |

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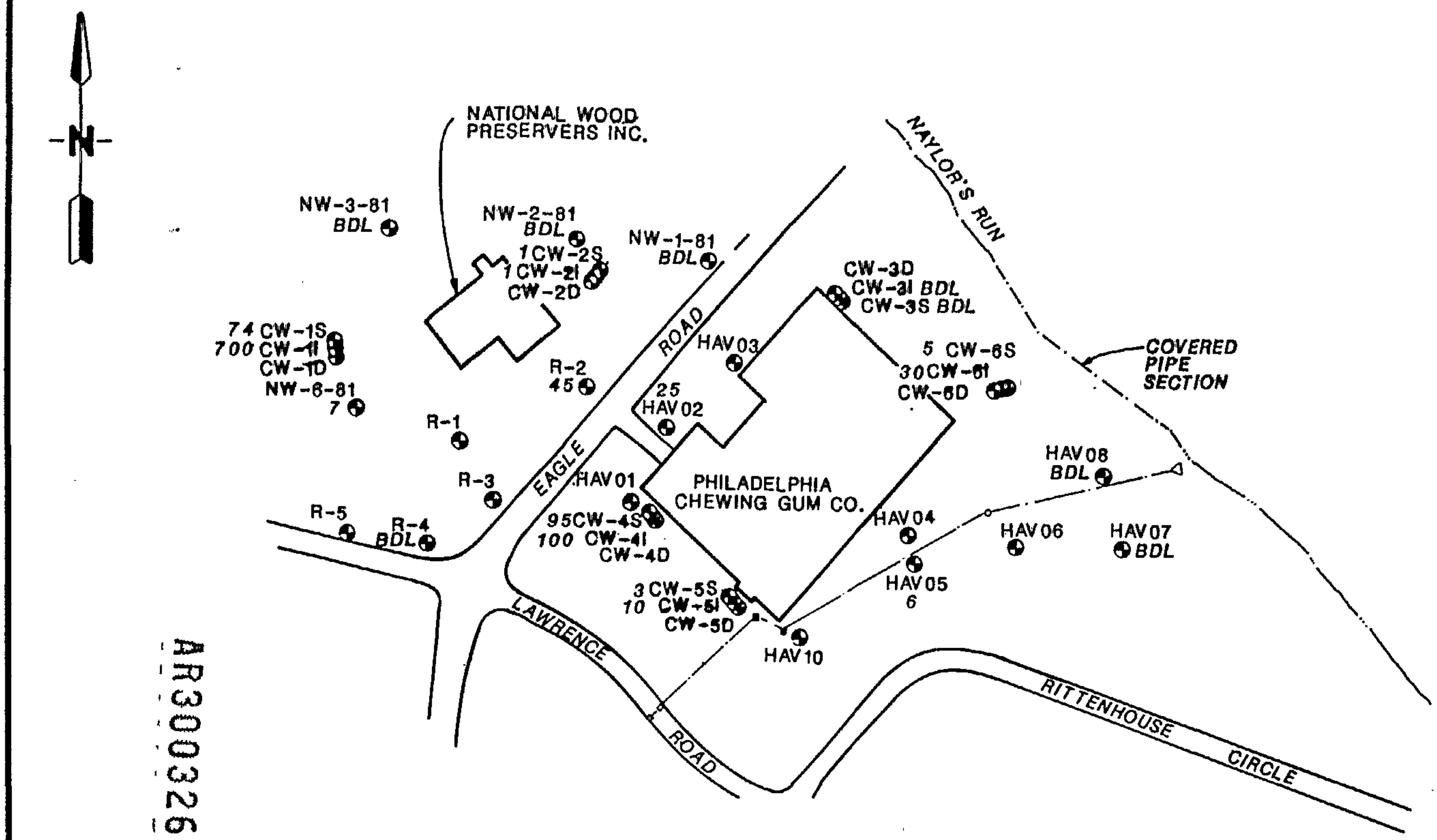
Chemical contaminants associated with solvents and degreasers were also identified in the groundwater. These chemicals are not constituents of fuel oil, nor were they reported in use in any past or present wood-treating operation at NWP. To assess the distribution of solvent constituents in the groundwater at the site, the chemical trichloroethene (TCE) was chosen as an indicator species because of its frequency of occurrence in the groundwater chemical results. The presence of solvents in the saprolite units was assessed by plotting the reported concentrations of TCE next to their appropriate well locations, as shown by Figure 5-30. From this plot, it is apparent that solvent constituents, as represented by TCE, are present throughout the area of investigation and apparently extend beyond the present monitoring well network. The highest concentrations appear to be located in the vicinity of one of the more upgradient wells, CW-1 series. As the general groundwater flow direction is toward the east-southeast, it appears that little, if any, solvent constituents are entering the site from the north, as illustrated by Figure 5-30. To refine estimates of source areas for the solvent and degreaser constituents identified in the groundwater of the saprolite units would require additional investigation. However, it appears that one or more source areas for solvent and degreaser constituents may exist west (upgradient) of the study area.

The distribution of solvents and degreasers, as represented by TCE, was also assessed for groundwater in the bedrock. Figure 5-31 depicts the concentrations of TCE in the bedrock monitoring wells at the site and is similar to the previously presented saprolite unit figure. The highest TCE levels were identified at CW-1, which implies a source located further upgradient from the study area. Figure 5-31 also shows that




AR300326

## LEGEND

| | |
|---|---|
| ⊕ | EXISTING WELL LOCATIONS |
| —·— | STORM SEWER |
| *BDL* | BELOW DETECTION LIMIT |

200' 0 200'
SCALE IN FEET

**FIGURE 5-30**

**HAVERTOWN PCP SITE**
**HAVERTOWN, PA**

TRICHLOROETHENE (ug/l) IN THE SAPROLITE UNITS GROUNDWATER ROUND 2

| drawn CLS | approved JNW | drawing no. |
|---|---|---|
| checked JST | date 5-31-88 | 86021-041-AA |

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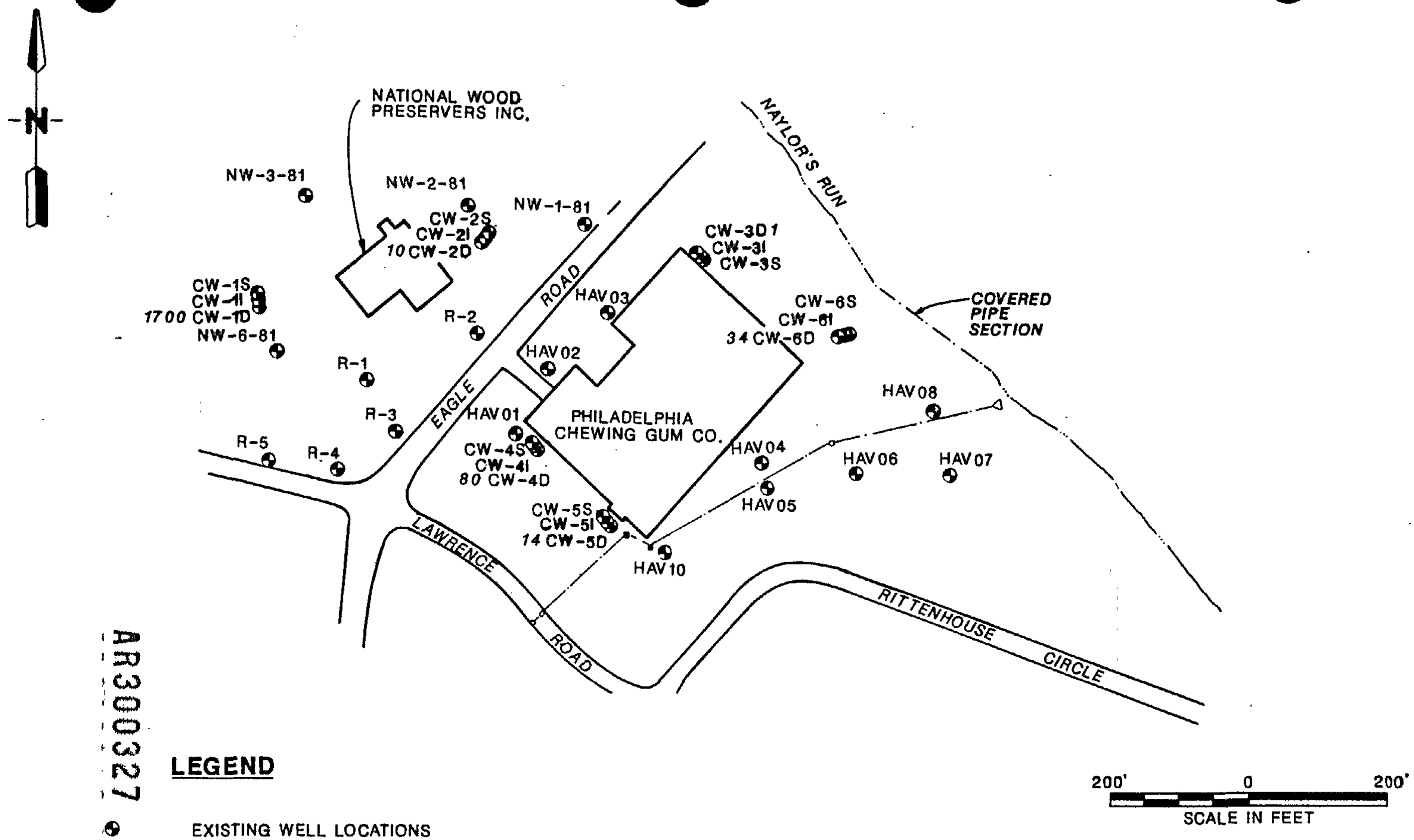


## LEGEND

EXISTING WELL LOCATIONS

STORM SEWER

FIGURE 5-31

**HAVERTOWN PCP SITE**
HAVERTOWN, PA

TRICHLOROETHENE (ug/l)
IN THE BEDROCK
GROUNDWATER ROUND 2

| | | |
|---|---|---|
| drawn CCS | approved JNW | drawing no. 86021-042-AA |
| checked JST | date 5-31-88 | |

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solvent and degreaser constituents are present beyond the present monitoring well network, as evidenced by CW-6D, which is the most downgradient deep monitoring well. In general, the groundwater in the bedrock at the study area contains elevated quantities of solvent/degreaser components.

5.3.6.3 Summary of Findings - Based upon the groundwater chemical results and the measurement and calculation of oil thickness at the Havertown PCP site, two areas of groundwater contamination were identified.

First, the existence of the subsurface floating oil plume was verified as being present beneath the site. Using fluid levels measured on April 11, 1988, calculations were performed to establish that the thickness of oil on the water table surface should be substantially less than the oil thicknesses measured in the monitoring wells. Accordingly, the volume of potentially recoverable floating oil is much less than previous investigators' estimates. A map of the estimated area affected by the floating immiscible oil has been produced, which based upon available data, indicates that the floating oil is present between NWP and PCG buildings.

Second, chemical results indicate that dissolved metals, hydrocarbons, pesticides, and isomers of dioxin and dibenzofuran exist in the groundwater at the site. Dissolved metals which were found in relatively high concentrations consisted primarily of copper, sodium, magnesium, iron, manganese, and potassium, while lower amounts of chromium, cadmium, lead, and zinc were also reported.

VOAs consisting primarily of benzene, ethylbenzene, 1,1,1-trichloroethane, vinyl chloride, xylene, and total 1,2-dichloroethane were identified in the groundwater, along with lower concentrations of 1,2-dichloroethane, methylene chloride, toluene, 1,1,2-trichloroethane, acetone, and 1,1-dichloroethene. VOAs generally increased in concentration with depth at the CW-1, CW-5, and CW-6 series monitoring wells, while decreasing in concentration with depth at the CW-2 series wells. In addition, there was no apparent correlation between the presence of oil in the monitoring wells and increased VOA concentrations in groundwater. In addition, VOAs have migrated past the present monitoring well network.

Relatively few species of BNAs were found in the groundwater; however, the concentrations of those BNAs that were present indicate that the groundwater is substantially contaminated, with bedrock being nearly as contaminated as the saprolite. The identified BNAs overwhelmingly consisted of PCP, with lower amounts of naphthalene, 2-methylnaphthalene, phenanthrene, and approximately 15 other BNA compounds. BNA contamination apparently extends beyond the present monitoring well network.

Pesticides were found in three monitoring wells--NW-3-81, R-4, and CW-2D--consisting of delta-BHC, gamma-BHC, and/or dieldrin. There were no PCBs found above detection limits in the groundwater samples.

Oil and grease was detected in 12 of the 28 wells sampled, and results indicate a minor trend of increasing oil and grease concentrations in the bedrock, while decreasing in concentration in the saprolite as one moves downgradient with the flow of groundwater.

Primary dioxin isomers found include hepta-, 1234678-hepta-, and octa-dibenzo-p-dioxins, with the highest total dioxin concentration occurring in well NW-1-81. It was also determined that wells with oil in them did not necessarily have the greatest dioxin concentrations and that dioxin was not identified in any of the known bedrock monitoring wells. The distribution of dioxin in the monitoring wells indicates that dioxin has migrated beyond the present monitoring well network.

Dibenzofuran isomers such as hepta-, octa-, and some hexa-chlorinated dibenzofurans were identified in the groundwater, with the greatest concentrations also found in well NW-1-81. There appears to be no correlation between the presence of oil in the monitoring wells and the respective dibenzofuran concentration.

As dissolved PCP was detected in the groundwater in significant amounts, an affected area map has been produced using PCP as a tracer for the dissolved contaminant plume originating from NWP. The plume delineated by the PCP should be considered a conservative estimate of the entire plume, as other contaminants, such as VOAs, are more hydrophilic than PCP and, with their lower analyte detection levels, may enlarge the dimensions of the dissolved plume.

Apparently, both the saprolite and the bedrock units contain significantly elevated quantities of dissolved gasoline/fuel oil constituents in the groundwater. In addition, solvents and degreasers, which are not constituents of fuel oil, were also detected in the groundwater at the site. Their existence indicates that other contaminant sources exist in addition to the subsurface fuel oil. Such sources may include the nearby automotive repair and service stations which probably use or formerly used solvents and degreasers such as those identified in the groundwater. Both the saprolite and bedrock units are affected by the presence of elevated levels of solvent and degreaser constituents.

From the data generated by this investigation, it is clear that a substantial quantity of PCP-contaminated fuel oil is present on the water table; however, because of monitoring well spacing and slow oil migration rates, the actual extent of the oil plume is uncertain. In addition, a substantial dissolved groundwater contamination plume has been shown to exist and extend past the present monitoring well network.

# 6.0 SURFACE WATER INVESTIGATION

# 6.0 SURFACE WATER INVESTIGATION

## 6.1 Surface Water Drainage

The Havertown PCP site is drained by Naylors Run which is a tributary to the Delaware River. Naylors Run flows in a southeasterly direction from the site through sections of natural streambed, concrete-lined man-made channels, and various drainage pipes before entering Cobbs Creek near Lansdowne, Pennsylvania, approximately four miles southeast of the site. Cobbs Creek empties into Darby Creek which flows through the Tinicium Wildlife Preserve before entering the Delaware River.

The drainage area of concern consists of the properties of NWP, PCG, and the residential homes along Rittenhouse Circle. Surface water from these areas enters Naylors Run through a system of natural and artificial routes.

Surface drainage from NWP flows predominantly in a northeasterly direction and is assisted by an 18-inch corrugated metal, storm sewer pipe which borders the eastern and southeastern side of the NWP property. Water enters the storm sewer pipe at inlets located near the pedestrian gate in the vicinity of Continental Motors and behind the Swiss Farm Market.

A significant amount of water has been observed to collect on numerous depressions across the NWP property, especially in the area of the main gate near Eagle Road. There, the surface water subsequently evaporates or percolates into the ground. When precipitation is significant, it was observed that a substantial amount of overland flow occurs, most of which exists on the property through the NWP main gate. This water, along with the water from the storm sewer, flows into a drainage ditch north of NWP which runs parallel to the abandoned railroad bed.

This drainage ditch routes water under Eagle Road and PCG's parking lot through a 24-inch, corrugated metal pipe (CMP). This pipe receives drainage from three inlets located in the PCG parking lot and joins with a 48-inch pipe carrying water from Naylors Run above the headwall of the abandoned railroad bed just north of the PCG property. This water then travels through a 60-inch CMP before emptying into Naylors Run.

A 36-inch CMP runs from Lawrence Road, behind PCG, in a northeasterly direction before emptying into Naylors Run. This pipe handles surface drainage from Lawrence Road, as well as picking up drainage from two inlets located at the southwest corner of the PCG building.

Drainage from Rittenhouse Circle occurs primarily as overland flow across the grass areas, road, sidewalks, and macadam driveways. This water is caught by storm sewers and transported to Naylors Run. Runoff from the grassy areas either percolates into the ground, evaporates, moves by overland flow to Naylors run, or is removed by subsurface drainage tiles installed by some Rittenhouse Circle residents to control the high water table. Drainage in the backyards of the homes bordering Naylors Run is poor as evident by the soft and wet ground surface, which predominates during a majority of the year.

Plate 1, the site base map, depicts the storm water and sanitary sewer system which were preliminarily investigated by REWAI during the RI. No information is available at this time concerning the subsurface drainage tiles installed by some Rittenhouse Circle residents.

## 6.2 Surface Water Sampling of Naylors Run

Surface water sampling was included as part of the RI at the Havertown PCP site. The purpose of the surface water sampling was to assess the extent of contamination in the water of Naylors Run as a result of groundwater influent and surface water runoff. Surface water sampling was conducted on July 24, 1987. Ten surface water locations were sampled, and in addition, a duplicate sample was taken at surface water location 9 (SW-9) for QA/QC procedures.

### 6.2.1 Sampling Procedures and Locations

The surface water sampling began with the downstream sampling locations and continued progressively upstream to avoid stirring up sediments and consequently degrading the quality of the samples. Each sampling location was marked with a wooden stake on the stream bank and flagged. A description of the location was recorded in the field notes and the position plotted on the project base map.

Samples were collected in an area of the stream where there was a steady but nonturbulent flow of water, by immersing a sample container and filling it without disturbing any sediments. An OVA meter was used throughout the sampling to monitor for organic vapors emanating from the samples, as well as in the working zone of the samplers. The results of these readings were included in the field notes.

### 6.2.2 Field Measurement of Chemical Parameters

Field parameters were taken at each surface water sampling location and are included herein as Table 6-1. These parameters included dissolved oxygen, pH, specific conductance, and temperature. Field pH measurements were made utilizing a battery-operated pH meter with a two-buffer (4.0 and 7.0) calibration. Specific conductance was measured using a Yellow Springs Instrument (YSI) Model 33 SCT meter calibrated with a standard solution at 25°C. The immersion thermometer on the SCT meter was used for making water temperature measurements to correct measured specific conductance measurements to their equivalents at 25°C. This was completed by utilizing the formula:

$$L_R = L_T/[1 + 0.019\ (T - R)]$$

where:

$L_R$ = conductivity at 25°C (reference temperature)
$L_T$ = conductivity at sampled temperature
$R$ = reference temperature
$T$ = sample temperature

(Dackombe and Gardiner, 1983, p. 154)

Dissolved oxygen was measured utilizing a YSI Model 51 D.O.-meter. This instrument provides measurement of dissolved

Table 6-1

Surface Water Parameters

| Location | Dissolved Oxygen (mg/l) | pH | Specific Conductance (umhos/cm [25°C]) | Temperature °(C) |
|---|---|---|---|---|
| SW-1 | 5.1 | 6.53 | 431 | 25 |
| SW-2 | 5.5 | 6.45 | 437 | 25 |
| SW-3 | 5.5 | 6.30 | 433 | 25.5 |
| SW-4 | 5.85 | 6.40 | 440 | 26 |
| SW-5 | 3.7 | 6.10 | 583 | 22 |
| SW-6 | 6.6 | 6.98 | 431 | 33 |
| SW-7 | 7.05 | 6.70 | 432 | 32 |
| SW-8 | 6.9 | 7.30 | 418 | 33.5 |
| SW-9 | 7.5 | 7.2 | 428 | 32 |
| SW-10 | 6.6 | 6.80 | 445 | 28 |

AR300337

oxygen calibrated to the oxygen in the air with regards to barometric pressure and elevation.

It is apparent from the field-measured surface water parameters that location SW-5 (storm sewer outlet) was unique among the surface water sampling locations. SW-5 had the lowest dissolved oxygen (3.7 mg/l) and pH (6.10) of the samples of surface water tested. In addition, SW-5 also had the highest specific conductance (583 umhos/cm @ 25°C) of the surface water samples. The storm sewer pipe (SW-5) apparently influences the quality of the surface water in Naylors Run by providing effluent waters which at least affect the surface water parameters tested here.

### 6.2.3 Chemical Results

Samples were collected and analyzed for the Hazardous Substance List (HSL) parameters, oil and grease, and dioxin and dibenzofuran. Results of these analyses are also included in Appendix 2.

Several HSL metals were detected in the water chemistry results included as Table 6-2 from surface water samples SW-1 to SW-10. Heavy metals such as cobalt, copper, lead, silver, and thallium were detected in samples at lower concentrations than zinc, calcium, sodium, potassium, and iron. The presence of metals such as zinc and copper may be associated with NWP due to the fact that these metals are used in the wood treatment process at the site. The detection of lead could be due in part to gasoline components being washed off of parking lots, road surfaces, and/or from automotive service stations in the area. Metals which were detected at higher concentrations, such as calcium,

Table 6-2

Surface Water Metals Results

| CL | CMPD-DESC | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 | 86021 |
| | | POINT | SURF WAT | SURF WAT | SURF WAT | SURF WAT | SURF WAT | SURF WAT | SURF WAT |
| | | SAMPLE | SW-1 | SW-2 | SW-3 | SW-4 | SW-5 | SW-6 | SW-7 |
| | | DATE | 07/24/87 | 07/24/87 | 07/24/87 | 07/24/87 | 07/24/87 | 07/24/87 | 07/24/87 |
| | | DEPTH | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | MATRIX | WA | WA | WA | WA | WA | WA | WA |
| | | METALS LAB ID # | 143081 | 143024 | 143025 | 143026 | 143027 | 143028 | 143029 |
| M | ANTIMONY | | BDL 50 UG/L | BDL 50 UG/L | BDL 50 UG/L | BDL 50 UG/L | BDL 50 UG/L | BDL 50 UG/L | BDL 50 UG/L |
| M | ARSENIC | | BDL 2.3 UG/L | BDL 2.3 UG/L | BDL 2.3 UG/L | BDL 2.3 UG/L | BDL 2.3 UG/L | BDL 2.3 UG/L | BDL 2.3 UG/L |
| M | BERYLLIUM | | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L | BDL 1 UG/L |
| M | CADMIUM | | BDL 4 UG/L | BDL 4 UG/L | BDL 4 UG/L | BDL 4 UG/L | BDL 4 UG/L | BDL 4 UG/L | BDL 4 UG/L |
| M | CHROMIUM | | BDL 10 UG/L | BDL 10 UG/L | BDL 10 UG/L | BDL 10 UG/L | BDL 10 UG/L | BDL 10 UG/L | BDL 10 UG/L |
| M | COPPER | | 8.8 UG/L | 11 UG/L | 10 UG/L | 10 UG/L | 6.4 UG/L | 21 UG/L | 22 UG/L |
| M | LEAD | | 2.2 N F UG/L | 3.5 N F UG/L | 2.9 N F UG/L | 2 N F UG/L | 5.2 N F UG/L | 4.1 N F UG/L | 1.4 N F UG/L |
| M | MERCURY | | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L | 2.6 N CV UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L | BDL 0.2 UG/L |
| M | NICKEL | | BDL 32 UG/L | BDL 32 UG/L | BDL 32 UG/L | BDL 32 UG/L | BDL 32 UG/L | BDL 32 UG/L | BDL 32 UG/L |
| M | SELENIUM | | BDL 7.5 UG/L | BDL 7.5 UG/L | BDL 7.5 UG/L | BDL 7.5 UG/L | BDL 7.5 UG/L | BDL 1.5 UG/L | BDL 7.5 UG/L |
| M | SILVER | | BDL 9 UG/L | BDL 9 UG/L | BDL 9 UG/L | BDL 9 UG/L | BDL 9 UG/L | BDL 9 UG/L | 21 UG/L |
| M | THALLIUM | | BDL 1.4 UG/L | 2.4 F UG/L | 2.9 F UG/L | 2.3 UG/L | 2.8 UG/L | BDL 1.4 UG/L | BDL 1.4 UG/L |
| M | ZINC | | 503 UG/L | 96 UG/L | 100 UG/L | 108 UG/L | 95 UG/L | 78 UG/L | 70 UG/L |
| M | BARIUM | | 55 E UG/L | 54 E UG/L | 54 E UG/L | 50 E UG/L | 71 E UG/L | 34 E UG/L | 34 E UG/L |
| M | IRON | | 2570 UG/L | 2560 UG/L | 2820 UG/L | 2710 UG/L | 15100 UG/L | 59 UG/L | 37 UG/L |
| M | MANGANESE | | 2630 UG/L | 2560 UG/L | 2720 UG/L | 2720 UG/L | 16300 UG/L | 64 UG/L | 68 UG/L |
| M | VANADIUM | | 7.2 UG/L | 7.2 UG/L | 7.5 UG/L | 8.1 UG/L | 9 UG/L | 9 UG/L | 9.6 UG/L |
| M | ALUMINUM | | BDL 57 UG/L | BDL 57 UG/L | BDL 57 UG/L | BDL 57 UG/L | 114 UG/L | BDL 57 UG/L | BDL 57 UG/L |
| M | COBALT | | 16 UG/L | 15 UG/L | 16 UG/L | 17 UG/L | 79 UG/L | BDL 5 UG/L | 5.2 UG/L |
| M | MAGNESIUM | | 12000 E UG/L | 12100 E UG/L | 12000 E UG/L | 12000 E UG/L | 16500 E UG/L | 11600 E UG/L | 11600 E UG/L |
| M | CALCIUM | | 34400 UG/L | 35100 UG/L | 34400 UG/L | 34500 UG/L | 31400 UG/L | 36900 UG/L | 37100 UG/L |
| M | SODIUM | | 29300 E UG/L | 29400 E UG/L | 28700 E UG/L | 29100 E UG/L | 37000 E UG/L | 30400 E UG/L | 30400 E UG/L |
| M | POTASSIUM | | 5020 UG/L | 3920 UG/L | 3850 UG/L | 3950 UG/L | 5520 UG/L | 4130 UG/L | 4040 UG/L |

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Table 6-2 (Cont'd)

Surface Water Metals Results

| CMPD | CL | CMPD-DESC | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE | 86021 | | 86021 | | 86021 | | 86021 | |
| | | POINT | SURF WAT | | SURF WAT | | SURF WAT | | SURF WAT | |
| | | SAMPLE | SW-8 | | SW-9 | | SW-9 DUP | | SW-10 | |
| | | DATE | 07/24/87 | | 07/24/87 | | 07/24/87 | | 07/24/87 | |
| | | DEPTH | 0 | | 0 | | 0 | | 0 | |
| | | MATRIX | WA | | WA | | WA | | WA | |
| | | METALS LAB ID # | 143030 | | 143031 | | 143033 | | 143032 | |
| 101 | M | ANTIMONY | BDL | 50 UG/L | BDL | 50 UG/L | BDL | 50 UG/L | BDL | 50 UG/L |
| 102 | M | ARSENIC | BDL | 2.3 UG/L | BDL | 2.3 UG/L | BDL | 2.3 UG/L | BDL | 2.3 UG/L |
| 103 | M | BERYLLIUM | BDL | 1 UG/L | BDL | 1 UG/L | BDL | 1 UG/L | BDL | 1 UG/L |
| 104 | M | CADMIUM | BDL | 4 UG/L | BDL | 4 UG/L | BDL | 4 UG/L | BDL | 4 UG/L |
| 105 | M | CHROMIUM | BDL | 10 UG/L | BDL | 10 UG/L | BDL | 10 UG/L | BDL | 10 UG/L |
| 106 | M | COPPER | 24 | UG/L | 27 | UG/L | 27 | UG/L | 20 | UG/L |
| 107 | M | LEAD | 1 | N F UG/L | 1.7 | N F UG/L | 2.1 | N F UG/L | 2 | N F UG/L |
| 108 | M | MERCURY | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L | BDL | 0.2 UG/L |
| 109 | M | NICKEL | BDL | 32 UG/L | BDL | 32 UG/L | BDL | 32 UG/L | BDL | 32 UG/L |
| 110 | M | SELENIUM | BDL | 1.5 UG/L | BDL | 1.5 UG/L | BDL | 1.5 UG/L | BDL | 7.5 UG/L |
| 111 | M | SILVER | 9.9 | UG/L | BDL | 9 UG/L | BDL | 9 UG/L | BDL | 9 UG/L |
| 112 | M | THALLIUM | BDL | 1.4 UG/L | BDL | 1.4 UG/L | 1.8 | UG/L | BDL | 1.4 UG/L |
| 113 | M | ZINC | 52 | UG/L | 326 | UG/L | 324 | UG/L | 44 | UG/L |
| 114 | M | BARIUM | 31 | E UG/L | 31 | E UG/L | 31 | E UG/L | 34 | E UG/L |
| 115 | M | IRON | 14 | UG/L | 257 | UG/L | 12 | UG/L | 150 | UG/L |
| 116 | M | MANGANESE | 36 | UG/L | 31 | UG/L | 29 | UG/L | 85 | UG/L |
| 117 | M | VANADIUM | 9.5 | UG/L | 9.9 | UG/L | 10 | UG/L | 9.8 | UG/L |
| 118 | M | ALUMINUM | BDL | 57 UG/L | BDL | 57 UG/L | BDL | 57 UG/L | BDL | 57 UG/L |
| 120 | M | COBALT | 5.4 | UG/L | 5.6 | UG/L | 5.5 | UG/L | 6.2 | UG/L |
| 121 | M | MAGNESIUM | 11300 | E UG/L | 11400 | E UG/L | 11000 | E UG/L | 11000 | E UG/L |
| 129 | M | CALCIUM | 35900 | UG/L | 35900 | UG/L | 35000 | UG/L | 36200 | UG/L |
| 130 | M | SODIUM | 30100 | E UG/L | 31000 | E UG/L | 29800 | E UG/L | 29100 | E UG/L |
| 131 | M | POTASSIUM | 4250 | UG/L | 5240 | UG/L | 5150 | UG/L | 4760 | UG/L |



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